

64. CYNOPTERUS LUCASI Dobs. Lucas's Fruit-Bat.

I understand Mr. Ridley has obtained this species both in Singapore Island (O. Thomas, A. M. N. H. ser. 7, i. p. 361, 1898) and in Selangor (Hanitsch, Rep. Raffles Libr. & Mus. 1897, p. 11).

Distribution. Malay Peninsula (Selangor and Singapore) and Borneo.

65. CARPONYCTERIS MINIMA (Geoffr.). The Small Long-tongued Fruit-Bat.

Carponycteris minima, Blanf. Faun. Ind., Mamm. p. 265.

Anderson (Cat. Mamm. Indian Mus. part i. 1881, p. 107) records a specimen from Siam collected by Dr. G. Finlayson, probably the same individual mentioned by Horsfield (Cat. Mamm. Mus. East-India Co. 1851, p. 29) "with a lengthened nose, perhaps a distinct species."

Distribution. Sikhim, Burma, Siam, Java, Philippines, Australia, New Ireland.

Another Fruit-Bat, *Eonycteris spelæa* (Dobs.), known from Burma, Cambodia, and Java, will probably be eventually found to occur in Siam and the Malay Peninsula.

Family RHINOLOPHIDÆ.

66. RHINOLOPHUS LUCTUS Temm. The Great Eastern Horse-shoe-Bat.

Rhinolophus luctus, Blanf. Faun. Ind., Mamm. p. 270.

Dobson (Cat. Chir. B. M. p. 106) records a specimen from Malacca.

Distribution. India, Ceylon, Burma, Malay Peninsula (Malacca), Java, Sumatra, Borneo, Philippines.

67. RHINOLOPHUS CÆLOPHYLLUS Peters. The Crosletted Horse-shoe-Bat.

Rhinolophus cælophyllus, Blanf. Faun. Ind., Mamm. p. 272.

I caught a single male in Bakar Bata house, near Alor Star, Kedah, 1st June, 1898. Mr. O. Thomas, to whom the specimen was sent, has confirmed my identification of the species.

Distribution. Burma, and Malay Peninsula (Kedah).

68. RHINOLOPHUS TRIFOLIATUS Temm. The Three-foliated Horseshoe-Bat.

Rhinolophus trifolius, Blanf. Faun. Ind., Mamm. p. 272.

Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) mentions this species from Singapore.

Distribution. India, Assam, Mergui, Malay Peninsula (Singapore) Java, Borneo.

69. *RHINOLOPHUS AFFINIS* Horsf. The Allied Horseshoe-Bat.

Rhinolophus affinis, Cantor, p. 11; Blanf. Faun. Ind., Mamm. p. 274.

Cantor records two individuals from Penang.

Dobson (Cat. Chir. B. M. p. 112) records a specimen from Penang, from Cantor.

Ridley obtained this species in Selangor (O. Thomas, A. M. N. H. ser. 7, i. p. 361).

Dimensions of Penang specimens, after Cantor:—

Sex	♂.		♀.	
Entire length	64 mm.	2·5 in.	73 mm.	2·89 in.
Tail	13 mm.	·5 in.	16 mm.	·63 in.
Extent	11·25 in.		12·5 in.	

Distribution. India, Ceylon, Burma, Cochinchina, Malay Peninsula (Penang and Selangor), Sumatra, Java, Borneo.

70. *RHINOLOPHUS MINOR* Horsf. The Little Indian Horseshoe-Bat.

Rhinolophus minor, Blanf. Faun. Ind., Mamm. p. 276.

Dobson (Cat. Chir. B. M. p. 115) records a specimen from Siam. Ridley obtained this species in Selangor (O. Thomas, A. M. N. H. ser. 7, i. p. 361).

Distribution. India, Burma, Siam, Japan, Malay Peninsula (Selangor), Sumatra, Java, Borneo.

71. *HIPPOSIDERUS ARMIGER* (Hodgs.). The Great Himalayan Leaf-nosed Bat.

Hipposideros diadema, Gray?, Cantor, p. 11.

Hipposiderus armiger, Blanf. Faun. Ind., Mamm. p. 283.

Cantor records this species from Penang and the Malay Peninsula. Dobson (Cat. Chir. B. M. p. 136) mentions a specimen from Penang from Cantor.

In the Siamese Museum there was a specimen in spirit, apparently of this species, from Chantaboon.

Distribution. India (Himalayas, Khasi Hills), Burma?, China, Cochinchina, Siam, Malay Peninsula (Penang).

72. *HIPPOSIDERUS DIADEMA* (Geoffr.). The Large Malay Leaf-nosed Bat.

Hipposideros nobilis, Cantor, p. 12.

Hipposiderus diadema, Blanf. Faun. Ind., Mamm. p. 284.

Cantor records this species from Penang and the Peninsula, and says: "In the valley of Pinang single individuals of both species (i. e. *H. diadema* and *H. armiger*) are at night abroad at all seasons, but during the rains they are particularly numerous." Dobson

(Cat. Chir. B. M. p. 137) mentions a specimen from Penang; O. Thomas (P. Z. S. 1886, p. 73) a specimen from Gunong Pulai, Johore, collected by Davison. Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records this species from Kuala Lumpur. In the Siamese Museum there is a specimen in spirit, apparently of this species, labelled "Bangkok."

Distribution. India (locally), Ceylon, Burma, Siam, Malay Peninsula (Penang, Selangor, Johore), Sumatra, Java, Borneo, Timor, Batchian, Amboyna, Philippines, Aru Islands.

73. *HIPPOSIDERUS GALERITUS* Cantor. Cantor's Leaf-nosed Bat.

Hipposideros galeritus, Cantor, p. 13.

Hipposiderus galeritus, Blanf. Faun. Ind., Mamm. p. 287.

Cantor described this species from "a solitary male captured in the valley of Pinang." Dobson (Cat. Chir. B. M. p. 142) records a specimen from Singapore, collected by A. R. Wallace.

Distribution. India (near Bellary), Ceylon, Malay Peninsula (Penang and Singapore), Java and Borneo.

74. *HIPPOSIDERUS LARVATUS* (Horsf.). Horsfield's Leaf-nosed Bat.

Hipposideros vulgaris, Cantor, p. 13.

Hipposiderus larvatus, Blanf. Faun. Ind., Mamm. p. 288.

Cantor records this species from Penang. Dobson (Cat. Chir. B. M. p. 145) records a specimen from Siam, collected by M. Mouhot.

Distribution. Assam, Sylhet, Burma, Siam, Malay Peninsula (Penang), Java, Borneo (Notes Leyd. Mus. xix. p. 52). Philippines?

75. *HIPPOSIDERUS BICOLOR* (Temm.). The Two-coloured Leaf-nosed Bat.

Hipposideros murinus, Cantor, p. 13.

Hipposiderus bicolor, Blanf. Faun. Ind., Mamm. p. 289.

Cantor records this species from Penang. Dobson (Cat. Chir. B. M. pp. 150, 151) records specimens of *H. bicolor* (typical variety, with ears as long as the head) from Penang and Singapore. O. Thomas (P. Z. S. 1886, p. 73) mentions a specimen from Klang, Selangor, collected by Davison—"♂, more pointed ears, a broader horizontal nose-leaf, and a much more largely developed projection between the nostrils than is usually the case in this species." Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) mentions *Phyllostoma bicolor*, var. *fulva*, from Kuala Lumpur.

I found *Hipposiderus bicolor fulvus* very numerous at Alor Star, Kedah, in May and June 1898, specimens flew into our house almost every night; and on the 26th June, 1898, I caught a single specimen in a house in Kuala Lumpur, Selangor, probably *fulvus*,

of which Mr. Oldfield Thomas remarks "rather different from others, but these *Hipposideri* want further working at."

Distribution. India, Ceylon, Assam, Burma, China, Nicobars, Malay Peninsula (Kedah, Penang, Selangor, Singapore), Java, Borneo, Philippines.

76. *HIPPOSIDERUS AMBOINENSIS* (Peters). The Little Leaf-nosed Bat.

Hipposiderus amboinensis, Blanf. Faun. Ind., Mamm. p. 290.

I caught two specimens on Penang Hill, 2400 feet, in March 1898.

Distribution. India (Himalayas and near Bellary), Malay Peninsula (Penang), Amboyna.

77. *HIPPOSIDERUS STOLICZKANUS* (Dobson). Stoliczka's Leaf-nosed Bat.

Phyllorhina stoliczkana, Dobs. Mon. As. Chir. p. 61, figs. *a*, *b*; and Cat. Chir. B. M. p. 132.

The type specimen was obtained by Dr. Stoliczka in Penang and presented by him to the Indian Museum, 1871.

Distribution. Malay Peninsula (Penang).

78. *CÆLOPS FRITHI*, Blyth. The Tailless Leaf-nosed Bat.

Cælops frithi, Blanf. Faun. Ind., Mamm. p. 291, fig. 88.

Distribution. "Originally described from a Sundarban specimen, but has recently been discovered at Darjiling by Col. Kinloch. It has also been found in Siam and Java."

Family NYCTERIDIDÆ.

79. *MEGADERMA SPASMA* (Linn.). The Malay Vampire Bat.

Megaderma spasma, Cantor, p. 19.

Megaderma spasma, Blanf. Faun. Ind., Mamm. p. 294.

Cantor records this species from Penang and the Peninsula.

Dobson (Cat. Chir. B. M. p. 158) records specimens from Penang, Singapore, and Siam.

Anderson (Cat. Mamm. Indian Mus. part i. 1881, p. 121) mentions specimens from Malacca, presented by Mr. W. G. Moxon, 1850.

Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) mentions specimens from Penang and from Selangor.

Distribution. Southern India?, Ceylon?, Tenasserim, Siam, Cochinchina, Malay Peninsula (Penang, Selangor, Malacca, and Singapore), Sumatra, Java, Borneo, Celebes, Philippines, Ternate.

80. *NYCTERIS JAVANICA* Geoff.

Nycteris javanica, Dobs. Mon. As. Chir. p. 81; and Cat. Chir. B. M. p. 164.

Anderson (Cat. Mamm. Indian Mus. part i. 1881, p. 122)

records a specimen from Malacca, presented by Mr. W. G. Moxon, 1851.

Distribution. Malay Peninsula (Malacca), Java.

Family VESPERTILIONIDÆ.

81. VESPERUGO NOCTULA (Schreb.). The Noctule Bat.

Vesperugo noctula, Blanf. Faun. Ind., Mamm. p. 308, fig. 93.

Dobson (Cat. Chir. B. M. p. 214) records a specimen from Singapore, called *Noctulina malaccensis* by Gray.

Distribution. Europe, Africa, Turkestan, India, Ceylon, China, Japan, Malay Peninsula (Singapore), Sumatra, Java.

82. VESPERUGO IMBRICATUS (Horsfield).

Vesperugo imbricatus, Dobson, Mon. As. Chir. p. 93, and Cat. Chir. B. M. p. 217.

Distribution. "Malay Peninsula (Malacca); Java" (Dobson).

83. VESPERUGO TENUIS (Temm.).

Kirivoula tenuis, Cantor, p. 15.

Vesperugo tenuis, Dobson, Cat. Chir. B. M. p. 226.

Cantor records this species from Penang.

Distribution. Malay Peninsula (Penang), "Sumatra, Java, Bo neo."

84. VESPERUGO ABRAMUS (Temm.). The Indian Pipistrelle.

Vesperugo abramus, Blanf. Faun. Ind., Mamm. p. 313.

Dobson (Cat. Chir. B. M. p. 228) records a specimen from Singapore. I caught specimens in the Officers' Mess, Sepoy Lines, Penang, in March, April, May, and June, 1895.

Distribution. Europe, India, Ceylon, Burma, Cambodia, China, Japan, Malay Peninsula (Penang and Singapore), Philippines, Celebes, New Guinea, Northern Australia.

85. VESPERUGO RIDLEYI (Thomas). Ridley's Pipistrelle.

Pipistrellus ridleyi, O. Thomas, A. M. N. H. ser. 7, i. p. 361 (1898).

Obtained by Mr. H. N. Ridley in Selangor, "caught under a railway arch."

Distribution. Malay Peninsula (Selangor).

86. VESPERUGO BLANFORDI Dobson. Limborg's Bat.

Vesperugo blanfordi, Blanf. Faun. Ind., Mamm. p. 317.

Anderson (Cat. Mamm. Indian Mus. parti. 1881, p. 133) mentions a specimen from Johore presented by Wood-Mason in 1873.

Distribution. Burma and Malay Peninsula (Johore).

87. *NYCTICEIUS KUHLI* (Leach). East Indian Yellow Bat.

Scotophilus temminckii, Cantor, p. 15.

Nycticejus kuhli, Blanf. Faun. Ind., Mamm. p. 320.

"Klâwah" of the Malays of the Peninsula (Cantor).

Cantor records this species from "Singapore, Penang, Malayan Peninsula and Islands," and says:—"This species is exceedingly numerous, forming large congregations in sheltered situations on the Malayan Peninsula, and in the caves on the numerous islands of limestone which stud the shores from Moulmein to Java, and in such localities large deposits of guano occur. The latter ('Ty Klâwah' of the Malays, *i. e.* bats' manure) has been tried by agriculturists at Penang, but has been found much less efficacious than the guano obtained from the swift (*Collocalia*) producing the edible nests." Horsfield says: "This species is very abundant, collecting by companies of hundreds, in trunks and hollows of trees, and feeding chiefly on white ants."

I caught a single specimen in the Officers' Mess House, Sepoy Lines, Penang, 23rd May, 1895.

♂. Head and body 2.63 inches; forearm 1.92; tail 1.65; extent 13.5

Near Alor Star, in Kedah, I found this species very numerous in June, 1898; the Malay boys caught them in nets. Out of eleven individuals examined only two were males.

Colour. Fur very dark brown above, the basal portion of the hair yellowish brown, pale yellowish brown below; ears and wing-membranes very dark brown.

Of these specimens Mr. Oldfield Thomas writes to me: "The *Scotophilus kuhli* from Kedah is quite remarkably dark-coloured. Had it not been for the existence of *S. castaneus* Gray from Pinang, I might have been tempted to give it a subspecific name."

Distribution. India, Ceylon, Assam, Burma, Malay Peninsula (Kedah, Penang, Singapore), Sumatra, Java, Borneo, Flores, Philippines.

88. *VESPERTILIO HASSELTII* Temm. Van Hasselt's Bat.

Distribution. "Malay Peninsula, Siam, Sumatra, Java, &c. . . Burma" (Blanf. Faun. Ind., Mamm. p. 330).

89. *VESPERTILIO ADVERSUS* Horsfield.

Vespertilio adversus, Blanf. Faun. Ind., Mamm. p. 330.

Dobson (Cat. Chir. B. M. p. 293) records specimens from Siam presented by Mr. W. H. Newman. Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) mentions "*Vespertilio adversus*" from Singapore.

Distribution. Burma?, Siam, Java, Borneo, Celebes, Australia, Malay Peninsula (Singapore).

90. *VESPERTILIO OREIAS* Temm.

Distribution. Singapore (Dobson, Cat. Chir. B. M. p. 305).

91. *VESPERTILIO MURICOLA* Hodgs. The Mustachioed Bat.*Vespertilio adversus*, Horsfield?, Cantor, p. 14.*Vespertilio muricola*, Blanf. Faun. Ind., Mamm. p. 337, fig. 109.

Cantor records this species from Penang.

Dobson (Cat. Chir. B. M. p. 317) records specimens from Siam, collected by M. Mouhot, and from Singapore.

In a house at Kuala Lumpor, Selangor, 26th June 1898, I caught a young bat, probably of this species; and in Bangkok, 5th Aug 1898, an undoubted specimen, also caught in a house.

Distribution. India, Ceylon, Tibet, Burma, Siam, Mergui Archipelago, Malay Peninsula (Penang, Selangor, Singapore), Sumatra, Java, Borneo, Celebes, Amboyna.92. *VESPERTILIO TRALATITUS* Horsf.“*Trilatitus horsfieldi*, Gray,” Cantor, p. 15.

Cantor records this species from Penang.

Distribution. Malay Peninsula (Penang), Sumatra, Java.93. *CERIVOULA PICTA* (Pall.). The Painted Bat.*Kirivoula picta*, Cantor, p. 15.*Cerivoula picta*, Blanf. Faun. Ind., Mamm. p. 339.

Cantor records this species from Penang. The Siamese Museum contained one spirit specimen, a male, not labelled but evidently obtained locally; its dimensions were:—

Head and body	40 mm.	1.58 in.
Tail	40 „	1.58 „
Ear	12 „	.5 „
Forearm	34 „	1.24 „
Extent	240 „	about 8.5 „

Subsequently I obtained another Siamese specimen through the kindness of Phra Ong Chow Sye Sanitwongse, who sent it with this interesting note: “6th April 1898. Orange-coloured bat from a swamp called Bang Falari at the Rangsit Canal: it sleeps in the flower of the Cala Lilly.”

Distribution. India, Ceylon, Burma, Siam, Malay Peninsula (Penang), Sumatra, Java; Borneo?

Family EMBALLONURIDÆ.

94. *TAPHOZOUS MELANOPOGON* Temm. Black-bearded Sheath-tailed Bat.*Taphozous melanopogon*, Cantor, p. 10; Blanf. Faun. Ind., Mamm. p. 347.

Cantor records this bat from Pulo Tikus, Pulo Lancavy, and the

Peninsula. Dobson (Cat. Chir. B. M. p. 381) records specimens from Penang and Pulo Tikus (Dr. Cantor).

Habits. In Bangkok I found these bats very numerous at all times of the year, spending the daytime in the roofs of buildings; a score or more were generally to be seen in the kitchen of the somewhat ruinous house I lived in. In the evenings they used to hunt regularly for insects in the house, flying from room to room in turn, with occasional pauses for rest on the walls; the great pace at which they flew, their graceful circling swoops, and the unerring accuracy with which they passed at full speed through



Head of *Taphozous melanopogon*, ♂.

Three-quarter and profile views. (Slightly larger than life.)

the holes in the wooden partitions between the rooms, were a constant pleasure to watch on many a damp, stifling-hot night. Their voice is very shrill and ear-piercing. They are very active in climbing about, and it is very curious seeing a party of them (disturbed during the day) retreating *backwards* up a wall. They

generally rest suspended by their hind feet, with the head rather thrust up, and the big ears flat against their necks.

In April 1898 I found these bats fairly numerous on the little island of Pulo Tikus, near Penang. They were living in the small caves by the sea, which are only accessible (to human beings) at low tide; the way the bats crawl over the rocks is wonderful, the general effect being more that of a crab than a mammal. I have also received a specimen of this species from Chantaboon.

Colour. Five specimens (3 ♂, 2 ♀) caught on Pulo Tikus on the same day (9.4.98) showed great variations in colour:—

♂ (a). Pale mouse-colour, tinged with rufous, breast lighter, belly white, black patch on throat.

♂ (b). Very yellowish rufous.

♂ (c). Dark grey; this specimen was rather smaller than either a or b, which were subequal in size.

♀ (d). Pale mouse-colour, breast lighter, belly white.

♀ (e). Similar to d, but darker and browner above.

The illustration of the head of this species given by Dobson (P. Z. S. 1875, and Mon. As. Chir. p. 167), which has been used in subsequent books (Cassell's Nat. Hist. i. p. 316, and Blanf. Faun. Ind., Mamm. p. 347, fig. 114), is, I venture to think, not adequate in giving a good idea of the physiognomy of this bat. The appended sketches (see p. 348) of a male, from Bangkok, drawn from life, will be seen to differ from Dobson's figure in the profile of the nose, the form and serrations of the ear, and the bristles on the face. Also *T. melanopogon* has a bright, intelligent look, which is lost in Dobson's figure, apparently drawn from a spirit specimen.

Distribution. India, Burma, Siam, Cochinchina, Malay Peninsula (Lancavy, Penang), Java, Borneo, Philippines.

95. *TAPHOZOUS LONGIMANUS* Hardw. Long-armed Sheath-tailed Bat.

Taphozous longimanus, Blanf. Faun. Ind., Mamm. p. 348.

Dr. F. A. Jentink (Notes from the Leyden Museum, vol. xix. p. 54, January 1897) says of specimens of this bat from Sintang, Borneo:—"The wings are white, strikingly contrasting with the dark-coloured (in alcohol) rest of the animal." Mr. Oldfield Thomas (A. M. N. H. ser. 7, vol. ii. p. 246, Sept. 1898) describes these white-winged specimens as *Taphozous longimanus albipinnis*, with a female from Labuan, collected by the late Mr. A. H. Everett, as the type of the subspecies, and says: "Four other Bornean specimens are similarly white-winged, and there is also a white-winged specimen in the Museum collection from Malacca collected long ago by Mr. A. Charlton" (*vide* Dobson, Cat. Chir. B. M. p. 385). During a few days I spent in Labuan in Sept. and Oct. 1897 a white-winged *Taphozous* was very noticeable, flying at evening-time in large numbers over the road from Usher Market to the Post Office, but I do not know whether they belonged to this species

or to *T. affinis* (also recorded from Labuan), or both. This was the only locality where I observed any white-winged bats.

Distribution. India, Ceylon, Burma, Malay Peninsula (Malacca), Borneo.

96. *TAPHOZOUS SACCOLLEMUS* Temm. Pouch-bearing Sheath-tailed Bat.

Taphozous saccollemus, Cantor, p. 10.

Taphozous saccollemus, Blanford. Faun. Ind., Mamm. p. 350.

Cantor mentions "two males captured at Pinang in houses in the valley."

Dobson (Cat. Chir. B. M. p. 389) records a specimen from Singapore.

Distribution. Peninsula of India, Ceylon, Sylhet, Burma, Malay Peninsula (Penang and Singapore), Sumatra, Java.

97. *TAPHOZOUS AFFINIS* Dobson.

Taphozous affinis, Dobson, Cat. Chir. B. M. p. 389.

A male was caught by Mr. Robertson Glasgow in the Botanical Gardens, Singapore, on Nov. 19, 1897, and presented by him to the Raffles Museum (Ridley, J. S. B. R. A. S. no. 31, 1898, p. 104).

Distribution. Singapore, Sumatra, Labuan.

98. *RHINOPOMA MICROPHYLLUM* Geoffr. The Long-tailed Bat.

Rhinopoma hardwickii, Cantor, p. 8.

Rhinopoma microphyllum, Blanford. Faun. Ind., Mamm. p. 351, figs. 116 & 117.

Cantor says: "A single male, in no way differing from Bengal individuals, was obtained by Captain Congalton, H.C. Steamer 'Diana,' in a cave on an island in Girbee river, in latitude 8° 0', on the Malayan Peninsula."

Distribution. N.E. Africa, Syria, India, Burma, and Malay Peninsula (latitude of Junkceylon).

99. *CHIROMELES TORQUATUS* Horsf. The Hairless Bat.

Cheiromeles torquatus, Dobson, Cat. Chir. B. M. p. 405.

Recorded from Penang, Malacca, and Singapore by Dobson (*op. cit.*). Anderson (Cat. Mamm. Indian Mus., part i. 1881, p. 150) mentions a specimen from Siam collected by Finlayson, which is also mentioned by Horsfield (Cat. Mamm. Mus. East India Co. 1851, p. 42), who says: "Discovered by Mr. George Finlayson, while attached to the mission of John Crawford, Esq., to Siam and Cochin China. The precise locality is not known."

Ridley (Nat. Science, 1895, vol. vi. p. 28) says, in Singapore "this is not a rare species. When it comes into the house at night, unlike most insectivorous bats, it is confused by the light, and is easily caught."

The Raffles Museum contains specimens from Singapore and

Pahang. There is a specimen from the Batu Caves, Selangor, in the Museum at Kuala Lumpur.

Distribution. Siam, Malay Peninsula (Penang, Selangor, Pahang, Malacca, Singapore), Sumatra, Java, Borneo.

100. *NYCTINOMUS PLICATUS* (Buchanan). The Indian Wrinkled-lipped Bat.

Nyctinomus tenuis, Cantor, p. 9.

Nyctinomus plicatus, Blanf. Faun. Ind., Mamm. p. 354.

Cantor records this species from the Malay Peninsula.

Dobson (Cat. Chir. B. M. p. 425) records specimens from the Malay Peninsula and Singapore.

An interesting account of these bats at Hpagat, Salween, Burma, by Capt. A. R. S. Anderson, appeared in 'Natural Science,' 1899, p. 259, taken from the "Administration Report of the Marine Survey of India, 1897-98."

Distribution. India, Burma, Malay Peninsula, Sumatra, Java, Borneo, Philippines.

101. *NYCTINOMUS JOHORENSIS* Dobson. Dato Meldrum's Bat.

Nyctinomus johorensis, Dobson, Cat. Chir. B. M. p. 432.

The type specimen was obtained in Johore by Dato James Meldrum. He sent it to Wood-Mason, who presented it to the Indian Museum, 1872. So far as I am aware, this is the only specimen in any collection.

Distribution. Malay Peninsula (Johore).

Order RODENTIA.

Family SCIURIDÆ.

102. *PTEROMYS ORAL* Tick. The Large Brown Flying-Squirrel.

Pteromys oral, Blanf. Faun. Ind., Mamm. p. 361, fig. 122.

"Baang-let" of the Siamese.

While in Siam (Nov. 1898) I was shown the skin of a Flying-Squirrel shot at Prachei (a place between Ayuthia and Korat), which agreed exactly with Blanford's description of this species.

Distribution. India, Ceylon, Burma, Mergui Archipelago, Siam.

103. *PTEROMYS PETAURISTA*, Pallas. The Large Malay Flying-Squirrel.

Pteromys nitidus, Cantor, p. 44.

Pteromys nitidus, O. Thomas, P. Z. S. 1886, p. 73.

"Túpai Térbang" or "Kúbin" of the Malays of the Peninsula (Cantor).

"Tupai Belang" of the Malays (Ridley).

"Grabah" or "Kubin" of the Malays (L. Wray, jun.).

Cantor records this species from Penang, Singapore, and the Peninsula, and says it is "very numerous in the Malayan countries."

It is not strictly nocturnal, for it is frequently seen abroad during the day. It is particularly fond of the Durian, the fruit of *Durio zibethinus*. The Flying-Squirrel has this partiality in common with various other animals, as monkeys, Pteropi and Paradoxuri; nay, the Malays assert, that they have to watch this, their favourite fruit, against tigers."

Horsfield (Cat. Mamm. Mus. East India Co. 1851, p. 162) records a specimen, under the name of *Pteromys melanotis*, from Siam, collected by Dr. G. Finlayson; W. L. Selater (Cat. Mamm. Indian Mus. part ii. 1891, p. 37) also mentions this specimen, and others from Malacca procured by the Rev. F. Lindstedt in 1845.

O. Thomas (P. Z. S. 1886, p. 73) records three specimens collected by Davison, from Klang (Salangor), Malacca, and Gunang Pulai (Johore) respectively, and says "these specimens all belong to the so-called species *Pt. melanotis*."

H. J. Kelsall (J. S. B. R. A. S. no. 26, Jan. 1894), in a list of Mammals from Johore, says presumably of this species:—" *Pteromys oral*, Tick. Red Flying-Squirrel. One specimen obtained at Simpai, on the Batu Pahat Sembrong."

Ridley (Nat. Science, vol. vi. 1895, p. 95) says:—"The red Flying-Squirrel, *Pteromys nitidus*, is still common in Singapore, inhabiting the thicker jungles. It remains quite quiet during the day, but at dusk begins to move about. It climbs with some clumsiness to a high point on a tree, and then dives off to the next, up which it climbs again, and again dives off, and so travels to its feeding ground. It appears to be very fond of coconuts, and will attack any that are near the jungles which it inhabits."

Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 10) records "*Pteromys petaurista* (=oral)" from Selangor, and "*Pteromys nitidus*" from Singapore.

In the Museum at Taiping I saw, in May 1898, six large Flying-Squirrels stuffed; two of these are very dark; Mr. Wray has labelled them *P. nitidus*, Malay name "Kubin," they are from Larut. The remaining specimens are very red; two are from Tapah, Batang Padang, and one from Larut: they are labelled *P. petaurista*, "The Taguan," Malay name "Grabah."

In the Museum at Kuala Lampor I saw, in June 1898, two stuffed specimens of *T. petaurista*, both obtained in Selangor; and Mr. A. L. Butler told me there was also a black *Pteromys* found in that neighbourhood, which he considered to be possibly a race of *P. oral*.

I have only once seen a *Pteromys* wild; it was apparently of this species, on Penang Hill, about 1800 feet elevation, on the 11th March, 1899. Just after sunset it passed near me, swooping down hill over the trees (which at this point were not high); we had a good view of it for about 100 yards, when it passed out of sight downhill; its parachute was kept quite steady, and its tail stiff straight out behind.

Distribution. Siam, Formosa, Malay Peninsula (apparently generally distributed), Sumatra, Java, Borneo.

104. *PTEROMYS PUNCTATUS* Gray. The Spotted Flying-Squirrel.

Distribution. Malacca and Burma (*vide* Blanf. Faun. Ind., Mamm. p. 366).

105. *PTEROMYS TEPHROMELAS* Günth.

O. Thomas (P. Z. S. 1886, p. 74) records two specimens collected by Davison, one from Klang, Selangor, and one from Jaffaria, Johore.

106. *SCIUROPTERUS ALBONIGER* Hodgs. The Parti-coloured Flying-Squirrel.

Distribution. "The Himalayas from Nepal eastward, at an elevation of 3000 to 5000 feet. Found also in the hills south of Assam, in Manipur, Yunnan, and Siam. Some skins in the British Museum from Borneo are also referred to this species." (Blanf. Faun. Ind., Mamm. p. 367.)

107. *SCIUROPTERUS SAGITTA* (Linn.). Horsfield's Flying-Squirrel.

Sciuropterus horsfieldii, Cantor, p. 45.

Sciuropterus sagitta, Blanf. Faun. Ind., Mamm. p. 367.

Of this species Cantor obtained a single skin, from Kedah.

In the Museum at Taiping I saw two specimens from Larut, Perak.

Distribution. Burma, Cambodia, Malay Peninsula (Kedah, Perak), Sumatra?, Banka, Java.

Personally, the only place where I have seen *Sciuropterus* alive was on Penang Hill, at about 2200 feet elevation. On the 17th March, 1896, I noticed two grey ones going from tree to tree in bright daylight; and on the 29th March, 1898, I obtained a male specimen near the same spot; I do not know to which species it belongs, the large ears have no pencils of hair at the base.

Colour. Above dark grizzled brown, plentifully sprinkled with rich rufous yellow (underfur of back grey, hairs dark brown tipped with rufous yellow). Tail, upper surface nearly uniform dove-coloured brown. Below, very pale lemon-yellow under the head, neck, and body; pale rufous under the parachute; light red under the tail. A dark patch round eye. Cheeks rufous yellow. Nose, chin, and ears pale mouse-colour. The fringe of hair on the anterior margin and corner of the lateral flying-membrane is above rich rufous, and below buff turning to a warm reddish yellow at the edge.

Size:—

Head and body	188 mm.	about	$7\frac{1}{2}$ inches.
Tail, without hair	195	"	$7\frac{3}{4}$ "
Tail, with hair	220	"	$8\frac{3}{4}$ "
Hind-foot, without claw ..	34	"	
Ear	22	"	
Extent	305	"	12 "

108. *SCIUROPTERUS DAVISONI* Thomas. Davison's Flying-Squirrel.

O. Thomas (P. Z. S. 1886, p. 74, pl. vi.) described this species from a specimen collected in Malacca by Davison.

109. *SCIUROPTERUS LEPIDUS* Horsf.

In the Museum at Kuala Lumpur there is a Squirrel from Selangor, which Mr. A. L. Butler tells me is of this species.

110. *SCIUROPTERUS GENIBARBIS* (Horsf.).

Cantor (p. 45) records this species from the Malay Peninsula, and gives the following dimensions of a male :—

Head and body	191 mm.	7½ inches.
Tail	178 „	7 „

Distribution. Malay Peninsula, Java.

111. *RATUFA BICOLOR* Sparrm. The Large Malay Squirrel.

Sciurus bicolor, Cantor, p. 38; Blanford, Faun. Ind., Mamm. p. 373.

Cantor says the dark variety is called by the Malays of the Peninsula "Chingkráwah étam," and is very numerous in the forests and hills of Penang and the Malay Peninsula; the light variety is called "Chingkráwah" or "Chingkráwah puteh," and occurs in Penang.

O. Thomas (P. Z. S. 1886, p. 75) records twelve specimens from the Malay Peninsula, from the following localities :—two from Salanga, Junkceylon; one from the Dindings; four from Klang, Selangor; one from Malacca; one from Jaffaria, Johore; and three from Gunong Pulai, Johore. He says: "With the exception of three or four of the cream-coloured examples so common in this species, all these specimens represent the typical black and yellow *S. bicolor*."

W. L. Sclater (Cat. Mamm. Indian Mus. ii. 1891, p. 9) records specimens from Perak, Malacca, and Singapore.

Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 58) says: "*Sciurus bicolor* Sparr. This very variable Squirrel is, in Pahang, usually of a dirty yellowish-white colour, almost tawny on the back. Seen far up the Taban River, and at Pulau Tawar." Also (Nat. Science, vi. 1895, p. 95) he writes:—" *S. bicolor* is a strictly arboreal squirrel, which lives in the tops of the higher trees in the thick jungles. It is very variable in colour. The commonest form in Singapore is black with a cream-coloured belly. In the Peninsula it is usually entirely cream-coloured. It is remarkably docile, but much less active than the smaller species. When eating, this species sits transversely on a bough, grasping it with its hind feet, the head and body hanging down on one side and the tail on the other. It eats fruits of different kinds, and also buds and leaves."

H. J. Kelsall (J. S. B. R. A. S. no. 26, Jan. 1894, p. 16) says:—"This squirrel, which is common in Johor, is here of a dirty

yellowish-white colour, somewhat darker on the back. Specimens were obtained at Kuala Sembrong and Batu Pahat."

The Museum at Taiping contains a specimen of the dark race from Maxwell's Hill, Larut, Perak. Mr. L. Wray tells me this squirrel is known as "The Jeelrang Squirrel," "Chingkrawah Itam," or "Tupai Nanding."

The Museum at Kuala Lumpur contains one dark specimen from Selangor.

The Raffles Museum contains a specimen from Singapore.

In the Siamese Museum we had a specimen from Phrabat.

I saw the dark race of this species in some high jungle-trees near the waterfall, Botanical Gardens, Penang, 1st January, 1896. Also on the 28th March, 1897, a little downstream of Paknam Kabin on the Bangpakong River, Siam, I saw one in a very tall tree: it was black above, pale fawn-colour beneath, had a very big, bushy black tail, and, so far as we could make out with field-glasses, it had *tufted ears*.

Distribution. Nipal, Sikhim, Bhutan, Assam, Manipur, Burma, Siam, Malay Peninsula (Junkceylon, Penang, Perak, Dindings, Selangor, Malacca, Pahang, Johore, Singapore), Sumatra, Java, Borneo; Celebes?

112. *SCIURUS FINLAYSONI* Horsf. Finlayson's Squirrel.

Sciurus ferrugineus, Blanf. Faun. Ind., Mamm. p. 375.

"Krá rawk khaw" (White Squirrel) of the Siamese.

Horsfield (Cat. Mamm. Mus. East India Co. 1851, p. 154) records a specimen from Siam collected by Dr. G. Finlayson.

This species is very numerous in parts of Siam; the Siamese Museum contained five specimens—a red one from Bangkok, October 1893; a red one from Chantaboon, July 1896; and three white ones without recorded localities. In March 1897 I saw six of the white race in various places on the Bangpakong River between Tahkamen and Kabin, they were all in trees, usually in the jungle. In January 1898 I saw one of the red race in trees in a mangrove swamp near the mouth of the Chantaboon River. In February 1898 we saw very many near Ayuthia, especially in a grove of trees a few miles north of the town; I did not see any on the ground, but always in the trees or clumps of tall bamboo. They were all engaged in love making, males were more numerous than females; they made a good deal of noise, a sort of clucking, rather like the cry of some species of woodpecker. The females have two pairs of mammae. These Ayuthia specimens varied greatly in colour (*v.* O. Thomas, P. Z. S. 1898, p. 245); in all the iris was dark brown, and the bare skin on hands and feet black. In August 1898 I saw one specimen on Klong Morn, a few miles from Bangkok. On the 28th August 1897, at Kosichang, I saw in the woods on Flagstaff Hill about 12 or 15 white squirrels, probably of this species, but apparently smaller and more buff (less pure white) than those I saw on the Bangpakong in March. On the 27th February, 1898, on revisiting the same woods, I saw

many of these squirrels; again they seemed to me smaller than *S. finlaysoni* of the mainland, but they looked pure white: perhaps they are a small island-race.

Distribution. Sikhim?, Burma, Siam.

113. *SCIURUS ERYTHRÆUS* Pallas. Pallas's Squirrel.

Sciurus erythræus, Blanford. Faun. Ind., Mamm. p. 377.

A stuffed specimen, apparently of this species, in the Siamese Museum, was said to have been obtained locally, which seemed probable, as the Siamese had a name for it—"Krarwak lai," that is, "The Variegated Squirrel."

Distribution. Assam, Burma, China?, Siam?

114. *SCIURUS HIPPURUS* Is. Geoffr.

Sciurus hippurus, Cantor, p. 41.

"Tupai Jinjang," "Ummu," or "Jau" of the Malays of the Peninsula (Cantor).

Cantor records this species from the Malay Peninsula.

Horsfield (Cat. Mamm. Mus. East Ind. Co. 1851, p. 154) records it from Malacca. O. Thomas (P. Z. S. 1886, p. 75) records three specimens from Klang, Selangor, collected by Davison, saying "This species seems to be the Malay representative of *S. erythræus* Pall., which does not, however, extend further south than Manipur, while Klang seems to be about as far north as *S. hippurus* has been found."

W. L. Sclater (Cat. Mamm. Indian Mus. part ii. 1891, p. 18) records two specimens from Malacca, from R. W. G. Frith, 1844.

In the Museum at Taiping there are several squirrels from the Larut Hills which Mr. Wray considers to be *S. hippurus*; they are about equal in size to *S. prevosti*, but have the back dark ferruginous instead of black, and have no white on the sides.

Distribution. Malay Peninsula (Perak?, Selangor, Malacca), Sumatra, Java, Borneo.

115. *SCIURUS CANICEPS* (Gray). The Golden-backed Squirrel.

Sciurus caniceps, O. Thomas, P. Z. S. 1886, pp. 68 & 76; Blanford. Faun. Ind., Mamm. p. 380.

O. Thomas (op. cit. p. 76) records seven specimens of *Sciurus caniceps concolor* from "Kussoom, Taroar, Poongah, and Salanga, Junkceylon," collected by Darling. W. L. Sclater (Cat. Mamm. Indian Mus. part ii. 1891, p. 14) records specimens from Perak which "have only a slight tinge of orange on the back, and no cheek-patches, and this form agrees very well with the specimen from Malacca (procured by G. Moxon, 1847), the type of *S. concolor*."

I shot a specimen, subsequently kindly identified by Mr. Thomas, near Gunong Gajah, Kedah, 13th April, 1895. ♂.

Distribution. Burma, Malay Peninsula (Junkceylon, Kedah, Perak, Malacca).

116. *SCIURUS GRISEIMANUS* M.-Edw. The Grey-footed Squirrel.

Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59), in a "List of Mammals recorded from Pahang," includes "*Sciurus griseimanus*, A. M.-Edwards," but unfortunately gives no details about it.

Distribution. Cochinchina, Cambodia, Upper Burma (Blanf. Faun. Ind., Mamm. p. 381), Laos (O. Thomas, P. Z. S. 1886, p. 68), and Malay Peninsula?

N.B.—*SCIURUS ATRIDORSALIS* Gray. The Black-backed Squirrel.

Sciurus atridorsalis, Blanf. Faun. Ind., Mamm. p. 382.

O. Thomas (P. Z. S. 1886, p. 76) records a single specimen from Klang collected by Davison, but says:—"There is possibly some mistake in the labelling of this specimen, as the species is not otherwise known to occur south of Tavoy, Tenasserim, and the specimen exactly matches some of Mr. Davison's Moulmein skins."

Davison (J. S. B. R. A. S. no. 20, 1889, p. 84) says he "obtained one specimen of the common squirrel *Sciurus atrodorsalis*" on Pulo Tioman in August 1889!

Distribution. Burma.

117. *SCIURUS MACCLELLANDI* Horsfield. The Striped Himalayan Squirrel.

Sciurus maclellandi, Blanf. Faun. Ind., Mamm. p. 386.

In the Museum at Taiping, Perak, there is a stuffed specimen of *S. maclellandi barbei* from Taiping (it is labelled *S. tenuis* Horsf.).

In the Siamese Museum there are two specimens, also of the *barbei* race, from Petchaburi, Siam.

I obtained a single individual in a tree in a wood near Bortong Kabin, 26th March, 1897.

Distribution. Sikhim, Eastern Himalayas, Assam, Cachar, Manipur, China, Formosa, Cochinchina, Siam, Tenasserim, Malay Peninsula (Perak, Malacca).

N.B.—Mr. J. L. Bonhote (A. M. N. H. ser. 7, vol. v. p. 53, 1900) distinguishes specimens from Perak as *Sciurus maclellandi leucotis* (Temm.), differing from *S. barbei* in having the light stripes narrow and hair of ear white at base.

118. *SCIURUS TENUIS* Horsfield. The Slender Squirrel.

Sciurus tenuis, Cantor, p. 42.

Cantor records this species from Singapore and the Peninsula, and apparently found it rare, only observing two individuals. Horsfield (Cat. Mamm. Mus. East India Co. 1851, p. 154) mentions a specimen from Singapore, collected by Finlayson.

O. Thomas (P. Z. S. 1886, p. 76) records eleven specimens from the Malay Peninsula; they are from Klang and Ulu Langkat in Selangor, from Malacca, from Gunong Pulai in Johore, and from Singapore, and says "these specimens are all very similar, and precisely agree with Horsfield's type."

W. L. Slater (Cat. Mamm. Indian Mus. ii. 1891, p. 20) records a specimen from Perak, and one from Malacca, collected by A. R. Wallace.

H. J. Kelsall (J. S. B. R. A. S. no. 26, Jan. 1894, p. 16), in a list of Mammals from Johore, says "*Sciurus tenuis*, Horsf. Fairly common. The smallest of the Malayan squirrels."

Ridley (Nat. Science, vol. vi. 1895, pp. 95 & 96) gives an account of the habits of this squirrel, and says it is very abundant and destructive in the Botanic Gardens, Singapore. Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) also records it from Singapore.

Distribution. Malay Peninsula (Perak, Selangor, Malacca, Johore, Singapore); "Pulo Panjang in the Gulf of Siam" (W. L. Slater, o. s. c.), Java, Sumatra, Borneo.

119. *SCIURUS PREVOSTI* Desm. Raffles's Squirrel.

Sciurus rafflesii, Cantor, p. 40.

"Tupai B'lang" of the Malays (according to Messrs. Ridley and Wray). Cantor records this species as numerous on the Malay Peninsula.

O. Thomas (P. Z. S. 1886, p. 76) mentions specimens from Klang, Selangor, and Malacca. W. L. Slater (Cat. Mamm. Ind. Mus. ii. 1891, p. 24) records specimens from Malacca. Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59) mentions this species being common at Kuala Semantan, Pahang, and (Nat. Science, vol. vi. 1895, p. 95) says of it, "one of the most beautiful kinds in the world, is common in the Malay Peninsula, but I never saw it in Singapore." Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records this species from Kuala Lumpor and from Pahang. In July 1898 I saw a specimen in the Raffles Museum labelled "*Sciurus rafflesii*, Singapore."

The Museum at Taiping contains specimens from Taiping and Blanja, Perak. Mr. A. L. Butler tells me this species is not uncommon in Selangor; there are several specimens in the Museum at Kuala Lumpor.

Distribution. Malay Peninsula (Perak, Selangor, Malacca, Pahang, Singapore?), Sumatra, Java, Borneo, Banka, Billiton, Celebes.

120. *SCIURUS NOTATUS* Bodd. The Malayan Squirrel.

Sciurus badging, O. Thomas, P. Z. S. 1886, p. 76.

Sciurus plantani of authors.

Sciurus vittatus, Cantor, p. 42.

Sciurus nigrovittatus, Cantor, p. 42.

? *Sciurus griseiventer*, L. Wray jun., label in Perak Museum.

Cantor records *S. vittatus* from Penang, Singapore, and the Peninsula, and says it is "the most numerous species in the Straits of Malacca," and *S. nigrovittatus* he records from the Peninsula and says it is "not numerous." O. Thomas (P. Z. S. 1886, p. 76) records specimens from Lumut in the Dindings; Jerome, Klang, and Birman in Selangor; Malacca; Gunong Pulai in Johore; and

Singapore ; and makes some very interesting remarks on the coloration of this species. W. L. Slater (Cat. Mamm. Indian Mus. ii. 1891, p. 23) records specimens from Perak and Malacca. Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59), in a "List of Mammals from Pahang," says: "*Sciurus notatus*, Bodd. This is perhaps the commonest of all the Malayan Squirrels. Common everywhere"; and mentions its habits in Nat. Science, vol. vi. 1895, p. 95.

H. J. Kelsall (J. S. B. R. A. S. no. 26, Jan. 1894, p. 16), in a list of Mammals from Johore, says "*Sciurus notatus*, Bodd. This pretty little squirrel is common everywhere." Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records this species from Singapore, Johore, Kuala Lumpor, and Pahang.

This is the commonest species both about Taiping, Perak, and Kuala Lumpor, Selangor ; there are several specimens in the local museums at both towns. It also seems the commonest species on Penang Hill ; I obtained a specimen there at 2200 feet elevation.

Distribution. Malay Peninsula (Penang, Perak, Dindings, Selangor, Malacca, Pahang, Johore, Singapore), Sumatra, Java, Borneo.

121. FUNAMBULUS BERDMOREI (Blyth). Berdmore's Squirrel.

Sciurus berdmorei, Blanf. Faun. Ind., Mamm. p. 387.

During March 1897 I met this squirrel near Tahkamen, on the Bangpakong River, Siam ; three specimens undoubtedly of this species, one in the jungle, two near a village, were seen running on the ground ; two others, apparently of this species, were seen climbing in a clump of bamboo.

In the Siamese Museum there were two specimens labelled "M. Pran, Siam."

Distribution. Martaban, Tenasserim, Mergui Archipelago, Siam, Cambodia, Cochinchina.

122. FUNAMBULUS LATICAUDATUS (Diard). Long-nosed Squirrel.

Sciurus laticaudatus, Cantor, p. 43.

Rhinosciurus laticaudatus, W. L. Slater, Cat. Mamm. Ind. Mus. ii. 1891, p. 30.

Cantor records this squirrel from the Malay Peninsula, gives a description of it, and says it is "apparently not numerous"; he examined five individuals. O. Thomas (P. Z. S. 1886, p. 78) records a specimen from Klang, Selangor. W. L. Slater (Cat. Mamm. Ind. Mus. ii. 1891, p. 30) records a specimen from the Malay Peninsula procured by G. Moxon in 1851. Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59), in a "List of Mammals recorded from Pahang," says "*Sciurus laticaudatus*, Diard. This appears to be a rare species. Kota Glanggi." Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 10) under the name of "*Xerus laticaudatus*" records a specimen from Pahang, probably the same as that mentioned by Ridley. A large pale rufous squirrel from Simpang, Perak, in the Museum at Taiping is considered by

Mr. Wray to belong to this species. Mr. A. L. Butler told me he shot two specimens in June 1898 near Kuala Lumpor, a female and a three-quarter-grown young one; the young one has dark rings on the tail, which are absent in the adult.

Distribution. Malay Peninsula (Perak, Selangor, Pahang), Borneo.

123. *FUNAMBULUS INSIGNIS* (F. Cuvier).

Sciurus insignis F. Cuv.

O. Thomas (P. Z. S. 1886, p. 78) records specimens from Klang in Selangor, and from Jaffaria in Johore. W. L. Sclater (Cat. Mamm. Ind. Mus. ii. 1891, p. 28) records a specimen from Malacca, presented by E. R. Alston. Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59), in a "List of Mammals recorded from Pahang," says: "*Sciurus insignis*, F. Cuv. This is a pretty squirrel with three black stripes down the back. It appears to live almost entirely on the ground. Taban River." Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 10), under the name of *Xerus insignis*, mentions this species from Ulu Pahang.

Distribution. Malay Peninsula (Selangor, Malacca, Pahang, Johore), Sumatra, Java, Borneo.

124. *FUNAMBULUS LOCRIA* (Hodgs.). The Orange-bellied Himalayan Squirrel.

Sciurus subflaviventris, Horsfield, Cat. Mamm. East India Co. 1851, p. 152.

Sciurus locria, Blanf. Faun. Ind., Mamm. p. 376.

Horsfield (*l. s. c.*) mentions a specimen "from G. Finlayson's Collection during Crawford's Embassy to Siam."

Distribution. Nepal, Sikhim, Manipur, Arrakan, &c., and probably Siam.

Family MURIDÆ.

125. *HAPALOMYS LONGICAUDATUS* Blyth. Berdmore's Rat.

Hapalomys longicaudatus, Blanf. Faun. Ind., Mamm. p. 401.

Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records a specimen from Patani.

Distribution. Burma and Malay Peninsula (Patani).

126. *VANDELEURIA OLERACEA* (Benn.). The Long-tailed Tree-Mouse.

Vandeleuria oleracea, Blanf. Faun. Ind., Mamm. p. 402.

One specimen, said to have been caught near Chantaboon, was given to me while in Siam; its dimensions in spirit were:—

Head and body	56 mm.	or	2·2 inches.
Tail	95 "		3·68 "
Hind foot	16 "		·63 inch.
Ear	11 "		·43 "

Distribution. India, Ceylon, Assam, Yunnan, Burma, Siam.

127. *CHIROPDOMYS GLIROIDES* (Blyth). The Pencil-tailed Tree-Mouse.

Chiropodomys gliroides, Blanford. Faun. Ind., Mamm. p. 403.

O. Thomas (P. Z. S. 1886, p. 78) records a mouse from Jaram, Selangor, collected by Darling, which probably belongs to this species.

Distribution. Burma, Malay Peninsula (Selangor), Java, Borneo.

128. *MUS RATTUS* LINN. The Common Brown Rat of the East Indies.

Mus rufescens, Cantor, p. 46.

Mus rattus, Blanford. Faun. Ind., Mamm. p. 406.

"Nu" of the Siamese (a term applied to all species of rats).

W. L. Slater (Cat. Mamm. Indian Mus. ii. 1891, p. 67) records a specimen of *Mus rattus rufescens* from Malacca, and one from Penang from Cantor's collection. Hanitsch (Rep. Raffles Libr. & Mus. 1887, p. 11) records this species from Singapore.

I have caught this rat in Sepoy Lines, Penang (May 1895), on Penang Hill (Nov. 1896 and March 1898), in Bangkok (April, June, July, Aug., Nov. 1897, and Feb., Aug. 1898), and in Ayuthia (Feb. 1898).

Colour. Specimens from Penang Hill: Above reddish brown, with longer dark hairs; beneath pale yellowish, buff, or fawny grey; the two colours gradually shade into each other on the sides.

Specimens from Bangkok: Above reddish brown (varying from bright rufous to yellowish), many of the larger hairs having black tips (most noticeable in adult specimens), base of fur on back grey; beneath pure white (out of about 20 specimens examined, one was yellowish beneath, one male grey, one female rufous grey with a little white on the lower part of the abdomen, one young female rufous grey); the line of demarcation between the darker upper and white lower parts is very noticeable (except in a young female, where they gradually shade into each other); hands and feet flesh-coloured, with short white hairs on their upper surfaces, the white hairs on the last segment of the toes may be longer than the claws.

Females from Penang and from Bangkok had each 5 pairs of mammae.

Distribution. Cosmopolitan.

129. *MUS CONCOLOR* Blyth. The Little Burmese Rat.

Mus concolor, Blanford. Faun. Ind., Mamm. p. 408.

W. L. Slater (Cat. Mamm. Indian Mus. ii. 1891, p. 68) mentions a skin from Malacca, collected in 1846. Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records this species from Singapore. The Siamese Museum contained three specimens from Bangkok.

Of this species I obtained three specimens from Penan

Hill, 2200 feet elevation, March 1896; two specimens from Tanglin, Singapore, April 1896; one specimen from Pachim, Siam, March 1897; one specimen from Paknam Menam, Siam, August 1898; and I saw what I believe to be this species at Pakpreo, Siam, in June 1897.

Colour of Paknam specimen:—Upper surfaces pale rufous brown, lower surfaces pure white, tail dark above and light below.

Distribution. Burma, Siam, Malay Peninsula.

130. *MUS DECUMANUS* Pall. "The Norway Rat."

Mus decumanus, Cantor, p. 46; Blanf. Faun. Ind., Mamm. p. 408.

"Tikus" of the Malays (name applied to any species of rat).

Cantor records this species from Penang and the Peninsula; Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records it from Singapore. In Siam I never saw this species alive or trapped it, but three times found dead rats (which appeared to be *M. decumanus*) in Bangkok, in each instance in that quarter of the town where the foreign shipping lies along the wharfs.

In Georgetown, Penang, this species is common; it is rufous brown above, buff below.

Distribution. Cosmopolitan.

131. *MUS MUSCULUS* Linn. The Common House-Mouse.

Mus musculus?, Cantor, p. 46; Blanf. Faun. Ind., Mamm. p. 413.

"*Tikus ruma*" (*i. e.* house-rat) of the Malays.

Cantor gives habitat "Pinang," and says:—"In colour, this slightly differs from the European mouse, the upper parts being a mixture of shining grey and tawny. The separate hairs are leaden-grey at the base, then tawny with black apex; some are longer and uniformly dark brown. Beneath pale ash. The ears are large, more than one-half the length of the head, with very short hairs, rounded, blackish. Toes, palms, and soles whitish. Tail slender, dark-grey, with very short appressed brown hairs. Length of the head and body, two and five-eighth inches (67 mm.), tail two and four-eighth inches (64 mm.)."

Hanitsch (Rep. Raffles Libr. & Mus. 1897, p. 11) records this species from Singapore. I obtained only three specimens of the Common Mouse, two trapped in houses in Singapore (Jan. & Dec. 1896), and one picked up dead in the bazaar at Chantaboon (Jan. 1898). There were none in the houses in which we lived, in Bangkok, Kedah, or Penang.

Of the second specimen from Singapore, Mr. Oldfield Thomas writes to me:—"Very typical house specimen, with brown metapodials but white fingers and toes, a very characteristic coloration."

Distribution. Cosmopolitan.

132. *NESOCIA* sp. inc. Bandicoot Rat.

At least one species of *Nesocia* occurs in the Malay Peninsula,

but what it is we cannot yet say for certain. Cantor seems to have observed two species: one (p. 45) he calls *Mus bandicota*, Bechstein, the other *Mus setifer*, Horsfield. Of the former he gives the Malay name as "Tikus besar" (*i. e.* big rat), and the habitat as "Pinang," and says:—"The larger of two individuals, captured in gardens, measured, head and body, ten and one-eighth inches (258 mm.); the tail seven and four-eighth inches (181 mm.)."

In May 1895 a species of *Nesocia* was common about out-buildings in the barracks in Penang.

Subsequently in April 1898 I trapped more Bandicoots in Georgetown, Penang; they were in colour:—above grey, with very long black hairs giving a very dark appearance; throat whitish buff, remainder of lower surfaces pale grey.

Three skulls and skins I sent to Mr. Oldfield Thomas, who kindly wrote to me they were "allied to *N. bengalensis*—perhaps *N. barclayana*, Anderson."

Family SPALACIDÆ.

133. RHIZOMYS BADIUS Hodgs. The Bay Bamboo-Rat.

Rhizomys minor, Horsfield, Cat. Mamm. Mus. East India Co. 1851, p. 165.

Rhizomys badius, Blanf. Faun. Ind., Mamm. p. 438.

Horsfield (*l. s. c.*) records a specimen from Siam obtained by Dr. G. Finlayson, who says it is called "Thúr" by the Siamese, and adds: "Our specimen is about 6 inches in length, and appears to be a young one. It readily submits to confinement, and is easily tamed. Like most animals of the genus, it is destructive to furniture, to grain, etc., and when suddenly surprised it throws itself upon the offensive, instead of making a precipitate retreat. Its principal food is unhusked rice or other grain, and it is fond of yams, pumpkins, etc., found in forests and woods near to Bamvasor."

Distribution. Nepal, Sikhim, Bhutan, Assam, Manipur, Burma, Siam.

134. RHIZOMYS SUMATRENSIS (Raffl.). The Large Bamboo-Rat.

Rhizomys sumatrensis, Cantor, p. 47; Blanf. Faun. Ind., Mamm. p. 439.

"Dekan" of the Malays (Wray).

"Woo'n" of the Siamese; also called "Tum."

Cantor records this species from the Malay Peninsula, describes its colour, gives dimensions, and says "In confinement, it is very savage, scarcely tameable." W. L. Sclater (Cat. Mamm. Indian Mus. ii. 1891, p. 96) records specimens from Malacca and from Alma Estate, Province Wellesley. The Raffles Museum possesses specimens from Malacca. The Museum at Taiping contains specimens from Batu Gajah and from Bukit Gantang, Perak. The Museum at Kuala Lumpur contains several specimens caught in the neighbourhood of that town. There were in the Siamese

Museum three stuffed specimens from Siam of a species of Bamboo-Rat: they had been labelled (probably by the late Dr. E. Haase) *R. badius*, but they looked to me more like the young of *R. sumatrensis*.

Distribution. Parts of Burma, Siam, and Malay Peninsula.

Family HYSTRICIDÆ.

135. *HYSTRIX LONGICAUDA* Marsden. The Malay Porcupine.

Hystrix longicauda, Cantor, p. 48.

"Lándak" or "Bábi Lándak" (*i. e.* pig-porcupine) of the Malays.

Cantor records this species from the Malay Peninsula, and says it "is numerous, and, as it is considered a delicacy by the Chinese population, is frequently brought to market." Ridley (*Nat. Science*, vi. 1895, p. 94) calls this species *Hystrix leucura*, and says of it:—"The Porcupine is still common in Singapore, but a number must be destroyed by the burning of the open country, in which they chiefly live. They are very destructive to the pine-apples." The Museum at Taiping contains a specimen from Larut, Perak. The Museum at Kuala Lumpur contains one young porcupine, apparently of this species, locality unknown but probably from Selangor.

On the 14th Oct. 1897, I bought a live porcupine from a Malay in Singapore, who said it had been caught on Bukit Timah; it soon became tame and an interesting pet. (It is still alive with me, February 1900.)

Distribution. Malay Peninsula (Perak, Selangor, Singapore), Sumatra, Java?, Borneo?

In the Siamese Museum there were two stuffed Porcupines, both labelled "Siam," representing apparently two species, but I do not know which: one with a pale brown forehead and a light crest had been labelled by some one "*H. bengalensis*;" the other had no crest, and had an old label "*H. hodgsoni*."

The Siamese call a porcupine "menn."

136. *ATHERURA MACRURA* (Linn.). The Asiatic Brush-tailed Porcupine.

Atherura fasciculata, Cantor, p. 49.

Atherura macrura, Blanf. Faun. Ind., Mamm. p. 446, fig. 146.

"Lándak" of the Malays.

"Landak-woobi" of the Malays of Selangor (A. L. Butler).

Diard and Duvaucel in 1821 (*Miscell. Papers Indo-China*, 2nd series, vol. ii. p. 208, 1887) speak of this species as "the porcupine of Queda" (*i. e.* Kedah), and say it "always carries its tail lifted up like a trumpet, and makes the tuft at the end tremble." Cantor records this species from Penang and the Peninsula, and says it "is very numerous in the Malayan valleys and hills. In its fretful habits and in its food it resembles the preceding porcupine, like which, it is carried to the markets at Pinang and Malacca, where as

many as twenty to thirty may frequently be seen." W. L. Sclater (Cat. Mamm. Ind. Mus. ii. 1891, p. 104) records a specimen from Malacca. Ridley (Nat. Science, vi. 1895, p. 94) says:—"The Brush-tailed Porcupine (*Atherura macrura*) is not a native of Singapore, so far as is known; it inhabits the limestone caves in Pahang." This probably refers to the animals which Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59), in his "List of Mammals recorded from Pahang," says were "caught in the Kota Glangga caves," but he then called them "*Hystrix longicauda*, Marsden." The Raffles Museum possesses a specimen from Malacca. The Museum at Taiping contains four stuffed individuals from Larut, Perak. The Museum at Kuala Lumpur contains one specimen without locality.

Distribution. Burma, Malay Peninsula (Kedah, Penang, Perak, Malacca, Pahang), Sumatra, Java; Borneo?

Family LEPORIDÆ.

137. LEPUS sp. inc. Hare.

A hare occurs in Siam, but I do not know of what species: I saw one caught alive at Genkoi (between Ayuthia and Korat), 21st November, 1897, and a leveret that had been caught near Chantaboon, January 1898.

Order PROBOSCIDEA.

Family ELEPHANTIDÆ.

138. ELEPHAS MAXIMUS L. The Indian Elephant.

Elephas indicus, Cantor, p. 52.

Elephas maximus, Blanf. Faun. Ind., Mamm. p. 463; S. Flower, Journ. Bombay N. H. S. vol. xi. no. 2, p. 335 (1897).

"Gajah" of the Malays.

"Chang" of the Siamese.

In the Royal Siamese Museum there was a life-size model of a male Siamese Elephant, and a most magnificent collection of about seventy tusks, all, so far as I could ascertain, from Siam; forty of these tusks are over 4 feet 8 inches (1420 mm.) in length.

The Selangor Museum contains six or seven skulls of local elephants.

Wild elephants do not occur in either Penang or Singapore, nor are tame ones employed there; but on the continent, both in Siam and the Malay Peninsula, elephants are found wild in suitable localities, and are trained for various purposes. Personally I only once came on wild elephants, a party of four, near the Bangpakong River, in March 1897; but in June 1897 we observed over a hundred wild ones caught in the Kraal at Ayuthia. I saw more or less trained elephants in Bangkok, Ayuthia, Chantaboon, Kedah, and Perak, but in the Southern Malay States the people do not seem to catch and tame them. H. J. Kelsall (J. S. B. R. A. S. no. 26,

Jan. 1894, p. 17) says: "The elephant appears to be common throughout Johore. Tracks were seen in many places on the Indau, and also on the Sembong, near P'ngkalan Repoh especially." Ridley (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59) says: "The elephant, though common all through Pahang, is never caught and tamed. Abundant in the Tahan woods;" and (Nat. Science, vol. vi. 1895, p. 162) remarks that "it is not excessively abundant, but is plentiful in many parts of the Peninsula."

Distribution. India, Burma, Siam, Malay Peninsula, Sumatra, and Borneo.

Order UNGULATA.

Family RHINOCEROTIDÆ.

Malay name for Rhinoceros, "Badak" (the final "k" not pronounced in most parts of the Peninsula).

Siamese name for Rhinoceros, "Rat."

A good deal of uncertainty exists as to how many species of Rhinoceros inhabit this region, and which they are, and it is difficult to obtain information; they are poorly represented in the local Museums—partly because almost all parts of the rhinoceros are highly prized by various natives of Asia; and I have been told that it is more profitable for a Malay, if he happens to catch one of these animals in a pitfall, to kill it and sell the remains to the Chinese, than to sell the whole animal to a European.

The only specimens of Rhinoceros in the Perak Museum (May 1898) were three hornless skulls without localities labelled *R. lasiotis*, *R. sumatrensis*, and *R. sondaicus* respectively. In the Selangor Museum (July 1898) there was a single unlabelled skull. The Raffles Museum (1898) had only a skeleton, labelled *R. sumatrensis* without locality. In the Siamese Museum we had a splendid series of over sixty separate, detached horns of Rhinoceros, some of remarkable shapes, but unfortunately their localities are not known. In February 1897 we acquired a specimen of *R. sondaicus*, which we skinned and stuffed. As an instance of how rhinoceros products are valued, I may mention that to skin this animal we had any number of eager volunteers, mostly Siamese women, who in return for the work of removing the skin only wanted to have some of the blood. The rhinoceros was skinned in an old Palace Garden in Bangkok under my directions; it was an extraordinary sight as we hurried to get it done before dark—a crowd of women, mostly clad only in a "panung" (Siamese loin-cloth), smeared with blood from head to foot, working away at the carcass with knives and fingers, little children collecting the blood in cocoanut-shells and running off with it to their homes, and Siamese men hanging round trying to get any of the flesh they could; it was very difficult to save the skeleton, several of the bones being snatched up and nearly carried off by these loafers.

Cantor (p. 54) says that *Rhinoceros unicornis* and *R. sondaicus* "appear to be numerous on the Malayan Peninsula;" and adds

(p. 55) "a *two-horned* Rhinoceros is stated by the Malays to inhabit, but rarely to leave, the densest jungle," which he expects to be *R. sumatrensis*. Unfortunately he does not mention seeing any local specimens, or give any details of why he includes *R. unicornis* in his list.

Personally I have never seen even the tracks of a wild rhinoceros. At Alor Star, Kedah, the Malays told me no rhinoceros was known in that district, which is mostly flat; they looked on it as an animal only inhabiting the mountains. An Englishman once told me he had seen tracks of rhinoceros on Gunong Jerai (Kedah Peak) at several thousand feet above the sea. In Perak, English friends have told me, rhinoceroses were not uncommon till three or four years ago in the Larut Hills *above* four thousand feet. In the south of Perak, however, a friend told me he had once seen a rhinoceros in a swamp, it was reddish in colour. The 'Bangkok Times' for 11th Nov., 1897, mentions a rhinoceros being shot by Mr. C. Ephraums: unfortunately this account, as usual, does not say to what species the animal belonged and gives but few details—the rhinoceros was "seen at a sulphur spring within six miles of Ipoh," Perak: it "was an old male, stood 6 feet high at the shoulder and about 8 feet in length; his 'Sumbu,' or horn, measured 13 inches and weighed 3 lbs."

Mr. Ridley told me that in 1896 he saw a rhinoceros in the Dindings; and (J. S. B. R. A. S. no. 25, Jan. 1894, p. 59) he mentions having seen tracks of some species of rhinoceros in the Tahan River woods, Pahang, where he also heard the animal at night.

Mr. T. ff. Carlisle, H.B.M. Consular Service, writing to me from Baw Yakar, Pailin, Battambang Province of Siam, 4th Feb., 1899, says "I have met an old Shan hunter here who has shot both the one-horned and the two-horned rhinoceros."

139. RHINOCEROS SONDAICUS Cuv. The Smaller One-horned Rhinoceros.

Rhinoceros sondaicus, Blanf. Faun. Ind., Mamm. p. 474, fig. 155 (p. 475).

A young female, just dead, was brought to the Siamese Museum on the 10th Feb., 1897, which I was told had been brought from the Laos Country, and had died on reaching Bangkok. There was no horn. Colour uniform dusky grey. Only one pair of incisors showed through the gums in the lower jaw, they were tusk-like; none showed in the upper jaw, the gum forming a hard pad in the place where the incisors of a horse would be.

Ridley (Nat. Science, vi. 1895, p. 161) says *R. sondaicus* appears to be the common rhinoceros of the Malay Peninsula. "It frequents the hill-jungles, ascending to 4000 feet altitude, and seems usually to move about at night, though one may come upon it by day. It has a habit of constantly using the same track, and dropping its dung in the same place daily, a habit common also to the tapir. As the jungle gets cleared, it wanders often into the

low, open country, apparently losing its way. It is a quiet, inoffensive beast."

Distribution. Sundarbans, parts of Eastern Bengal, Sikhim Terai, Assam, Burma, Siam, Malay Peninsula, Sumatra, Java, Borneo.

140. RHINOCEROS SUMATRENSIS Cuv. The Asiatic Two-horned Rhinoceros.

Rhinoceros sumatrensis, Blauf. Faun. Ind., Mamm. p. 476.

The "Bada Api" or "Fire Rhinoceros" of the Malays is probably a red variety of this species.

Slater (Tr. Z. S. ix. p. 651, 1875) mentions a rhinoceros of this species "captured in the Sunghi-njong (presumably Sungei-Ujong) district of Malacca," and says other specimens "from the same district or the neighbouring territory of Johore were imported into Europe."

W. L. Slater (Cat. Mamm. Ind. Mus. ii. 1891, p. 205) records specimens from Malacca.

Mr. A. L. Butler in a letter to me, from Kuala Lumpur, dated 25th Oct., 1898, says:—"I went to see a big rhinoceros in a pitfall the other day at Rantan Panjang. A fine big female *R. sumatrensis*, a dark reddish-brown beast, 4 feet 3 inches at shoulder (measured with a standard) and about 8 feet to 9 feet in length (guessed). The great thing that struck me was her extraordinary tameness. She had only been caught three days, but fed readily from one's hand, and seemed to enjoy being scratched."

Distribution. Assam, Tenasserim, Siam, Malay Peninsula, Sumatra, Borneo.

Family TAPIRIDÆ.

141. TAPIRUS INDICUS Cuv. The Malay Tapir.

Tapirus malayanus, Cantor, p. 55.

Tapirus indicus, Blauf. Faun. Ind., Mamm. p. 478.

"Badak tampong" (*i.e.* Piebald Rhinoceros) of the Malays in Kedah and Perak.

Bádak," "Kúda Ayer," and "Tennú" of the Malays of the Peninsula, *apud* Cantor.

"Tenok" of the Malays, *apud* Ridley.

Cantor mentions specimens from Province Wellesley and Kedah. W. L. Slater (Cat. Mamm. Ind. Mus. ii. 1891, p. 198) records two specimens from Malacca, obtained in 1820 and 1848.

Ridley (J. S. B. R. A. S. no. 25, p. 59) says tracks of the Tapir were seen near Temerloh, Pahang, and (Nat. Science, vi. 1895 pp. 161, 162) mentions the supposed protective coloration of the young.

There are specimens from Larut in the Museum at Taiping, and from Malacca in the Raffles Museum.

H.H. the Rajah Mudah of Kedah told me (June 1898) that the Tapir is not uncommon in the swamps of Kedah, within a day's

journey of Alor Star. Mr. F. H. Malcolm Staples told me (Sept. 1897) that the Tapir is still sometimes met with about Batu Pahat, Johore.

On the 25th July, 1898, I saw a young Tapir alive in Bangkok: it had been brought from the Malay Peninsula, from between Kedah and Singora; it was kept in the King of Siam's menagerie, and died about 6th August, 1898.

Distribution. Tenasserim, Lower Siam, Malay Peninsula, Sumatra.

Family BOVIDÆ.

142. *BOS GAURUS* Ham. Smith. The Gaur or S'ladang.

Bos gour, Cantor, p. 64.

Bos gaurus, Blanf. Faun. Ind., Mamm. p. 484, fig. 159 (p. 488).

"Kating" of the Siamese (both *B. gaurus* and *B. sondaicus* seem included in this name).

"Sápi útan" (*i. e.* Cattle of the Woods) of the Malays of the Peninsula, *apud* Cantor.

"S'ladang" of the Malays.

W. L. Sclater (Cat. Mamm. Ind. Mus. 1891, p. 125) records a skull and horns from Malacca from Dr. Maingay, 1863. Ridley (J. S. B. R. A. S. no. 25, 1894, p. 59) says: "The S'ladang is to be met with all through the Pahang jungles, but, owing to its shy and retiring habits, is difficult of approach. Tahan woods and all down Pahang River."

In the Museum at Taiping there are horns from Batang Padang, Perak, and many fine heads from Pahang shot by Mr. C. F. W. Curtis. In the Museum at Kuala Lumpur there are a stuffed bull and numerous heads shot by the late Captain H. C. Syers in Selangor. The Raffles Museum contains a skull from Ulu Pahang presented by Mr. W. Bertrand Roberts.

Mr. W. Sinclair told me in Jan. 1898 that there are wild cattle, probably of this species, in the hill-jungle at the back of Anghin, Siam.

A pair of horns, apparently of this species, from near Raheng, Siam, measured in length 24 inches, and in circumference at the base 17 inches.

Mr. A. J. A. Jardine, Inspector General of Police, Bangkok, told me he had found a Gaur killed by wild dogs near Shagan Salween River, Burma.

Distribution. Parts of India, Assam, Burma, Siam, Malay Peninsula; CochinChina?

143. *BOS SONDAICUS* Müll. & Schleg. The Banting or Tumbaadu.

Bos sondaicus, Blanf. Faun. Ind., Mamm. p. 489.

"Kating" of the Siamese.

"Sapi-utan" of the Malays.

In March 1897 I saw detached horns, apparently of this species,

in the Governor's house at Pachim, Siam ; they were said to have been obtained in that province.

The Banting is probably very rare in the Malay Peninsula : Mr. H. N. Ridley told me one was killed by Mr. Oxley at Muar about fifty years ago ; Mr. J. Rodger, C.M.G., has in his possession a single horn, apparently of this species, obtained from a Sakei ; and both Mr. Ridley and Mr. A. L. Butler tell me one was killed recently in Perak.

Distribution. Burma, Siam, Malay Peninsula, Java, Bali, Borneo, and Sumatra ?

144. *BOS BUBALUS* Linn. The Buffalo.

Bubalus arnee, Cantor, p. 65.

Bos bubalus, Blauf. Faun. Ind., Mamm. p. 491.

" Khwai " of the Siamese.

" Karbau " of the Malays.

Cantor says :—" The wild Buffalo is reported, but apparently without proof, to be indigenous in the Malayan Peninsula. Domesticated it is very plentiful." Ridley (J. S. B. R. A. S. no. 25, 1894, p. 59) says it is very doubtful if the Buffalo occurs in a wild state in Pahang.

I was told, on good authority, that there are Buffaloes near Pailin, in Siam, descendants of some that ran wild about fifty years ago.

Distribution. Wild in parts of India and Ceylon. Wild or feral in parts of Burma, Siam, and the Malay Peninsula. Domesticated in Egypt, Italy, Southern Asia, and the Malay Islands.

145. *NEMORHÆDUS SUMATRENSIS* (Shaw). Goat-Antelope.

Nemorhedus sumatrensis, Cantor, p. 64.

Nemorhædus sumatrensis, Blauf. Faun. Ind., Mamm. p. 514.

" Leea'ngpah " or " Ooarpah " of the Siamese.

" Kambing útan " or " Kambing gran " of the Malays.

" Black Mountain-goat " of the English in the Straits Settlements.

Cantor says " it appears to be numerous on the Malayan Peninsula, but exceedingly difficult to obtain, as it frequents the steepest hilly localities, and is very shy and active."

W. L. Sclater (Cat. Mamm. Indian Mus. ii. 1891, p. 151) records a skull from Province Wellesley.

Ridley, writing on the Mammals of Pahang (J. S. B. R. A. S. no. 25, 1894, p. 60), remarks : " This wild goat is supposed to occur in the high mountains of the interior, but there is no record of its having been obtained " ; and (Nat. Science, vi. 1895, p. 163) says it " inhabits the isolated patches of limestone rocks which flank at intervals the main granite chain of the Peninsula. Though apparently not rare in these places, it has never been shot by any sportsman."

In the Museum at Taiping there is a stuffed head from near

Kuala Kangsar, Perak, and a complete skeleton and two pairs of horns, all, I understand, from Perak. In the Museum at Kuala Lumpur there are several frontlets and horns, without locality.

Mr. A. L. Butler told me he saw a Goat-Antelope in March 1898 near "the Cottage" in the Larut Hills, Perak, at an elevation of about 4000 feet; and in a letter, dated 14th March, 1899, mentions Sir Frank Swettenham as having shot one in the Perak Hills. This is the first instance, to my knowledge, of one of these animals being shot by a European sportsman in the Peninsula, though many have tried. In another letter, dated 5th November, 1899, Mr. Butler tells me he has examined three specimens, and says "the *Nemorhædus* of the Peninsula is not *N. sumatrensis*, having legs black instead of rufous."

The Siamese Museum possesses a stuffed female from the Laos country, each horn 7·8 inches (198 mm.) in length, and a frontlet without locality, each horn 7·4 inches in length. A frontlet from the hills between Raheng (Siam) and Burma was shown me by Mr. J. Harper: length of horns 7·75 inches, circumference of horns at base 5·25 inches; a horn in my possession from Perak is 6·15 inches in length, and 4·5 inches in circumference at base.

In July 1898, a live goat of this species was exhibited in Bangkok, but I was unable to find out where it had been caught; it was a very handsome animal, nearly black in colour.

Distribution. Eastern Himalayas, Moupin, Yunnan, Assam, Burma, Siam, Malay Peninsula, Sumatra.

Family CERVIDÆ.

146. *CERVULUS MUNTJAC* (Zimm.). The Kakar, or Barking Deer.

Stylloceros muntjac, Cantor, p. 61.

Cervulus muntjac, Blanf. Faun. Ind., Mamm. p. 532, fig. 173.

"Kijang," "Kidjang" "Kidang," or of the Malays.

Recorded from Kuala Tahan, Pahang, by Ridley (J. S. B. R. A. S. no. 25 1894, p. 60), who (Nat. Science, vi. 1895, p. 164) says:—"The Kijang does not occur now in Singapore, if it ever did. It is abundant in many places, such as the slopes of Mount Ophir, and is often shot by planters and others in and about the coffee plantations." This species is kept in the Singapore Botanical Gardens, where it breeds.

There are specimens from Upper Perak in the Museum at Taiping, and from Selangor in the Museum at Kuala Lumpur.

Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 7) mentions a young *C. muntjac*, 24 hours old, "showing clearly the white longitudinal striations, which soon disappear in older animals."

The Kijang occurs in Siam. There is a pair of antlers in the Siamese Museum, presumably local, the length from burr to tip is 4·25 inches; and Mr. N. Kelly Passmore gave me the skull of one which had been shot by his overseer near Muok Lek, about

900 feet elevation, in the Dong Phya Fai: the right antler from burr to tip measured along the curve 6·5 inches, the left 6·75 inches (171 mm.). A deer we saw and heard on the Bangpakong River in March 1897 was probably of this species, though I failed to procure a specimen.

Distribution. India, Ceylon, Burma, Siam, Cambodia, Hainan, Malay Peninsula (Perak, Selangor, Malacca, Pahang), Sumatra, Java, Lombok, Borneo.

147. *CERVUS SCHOMBURGKI* Blyth. Schomburgk's Deer.

"Qua-an" of the Siamese.

Distribution. Parts of Siam.

148. *CERVUS ELDI* Guthrie. The Thameng.

Panolia acuticornis, Cantor, p. 64.

Cervus eldi, Blanf. Faun. Ind., Mamm. p. 541, fig. 176.

"Sam-an" of the Siamese.

Cantor says "A single skull of a stag, killed in Keddah, has the horns so like those of the Munneepore animal, that the species might be taken to be identical, but that the Malays assert theirs to be maned, and of a dark colour, with white spots, like the *Axis*. This stag is further described as being extremely wary, and therefore seldom seen but on heights inaccessible to man." H.H. the Rajah Mudah of Kedah, who is keen on shooting, told me the Thameng does not exist in Kedah; antlers are sometimes conveyed there from Siam, a pair of which probably were brought to Cantor, with imaginary details to enhance their value, the statement that they frequent "heights inaccessible to man" being alone suspicious in regard to this plain-dwelling species.

W. L. Selater (Cat. Mamm. Indian Mus. ii. 1891, p. 181) records a frontlet of this species supposed to have been "brought from Penang" in 1846; this may have been imported from Siam, *via* Singora and Kedah.

Mr. H. Warrington Smyth ('Five Years in Siam,' vol. ii. p. 217) says the plain round Battambang "is much frequented by herds of the *Lamang*, or *Eld's* Deer," and describes how the Cambodians capture them.

Distribution. Manipur, Burma, Siam, Cambodia, Hainan.

149. *CERVUS UNICOLOR* Bechstein. The Sámbar.

Rusa equina, Cantor, p. 63.

Cervus unicolor, Blanf. Faun. Ind., Mamm. p. 543, fig. 177 (p. 544).

"Nua" of the Siamese.

"Rusa" of the Malays.

Cantor records the *Rusa* from the Malay Peninsula and Penang; so far as I have been able to ascertain, it is now extinct in Penang, and has been so for the last 25 or 30 years. H. J. Kelsall

(J. S. B. R. A. S. no. 26, 1894, p. 17) says:—" *Cervus equinus*, Cuv. Tracks of the Sambhur were seen on Gunong Janeng. This deer is probably common in the Johore jungles, but owing to its shy nature is seldom seen." Ridley (J. S. B. R. A. S. no. 25, 1894, p. 60) records this species from Pahang, observing: "The Malayan Sambur, apparently the same as the Indian species, but the horns do not attain the same length"; and (Nat. Science, vi. 1895, p. 164) says:—"The *Cervus equinus* is common in the Peninsula, and a few still occur in Singapore; . . . the young are produced singly, and are coloured like the adult, but with much softer hair. There are, however, faint traces of light spots on the rump, which disappear after the first week"¹. Writing to me on 11th Sept., 1899, Ridley says: "Sambar breed regularly in the Singapore Gardens, and they also breed in Government House Park. The young usually have a couple of white spots on the sides near the rump, not very distinct. They are not fully spotted like Axis. I should say certainly that the Sumatran deer is a distinct animal, *Cervus hippelaphus*. It would not cross with the other deer" (*i. e.*, Peninsula Sambar). In the Museum at Taiping there is a stuffed female from Upper Perak, and antlers from Upper Perak, Batang Padang, and Larut. In December 1896 I saw a Sambar stag in a small patch of jungle within about a mile of the town of Taiping. In the Museum at Kuala Lumpur there are specimens from Selangor. The Sambar appears to be numerous in parts of Siam; we had a stuffed female and two pairs of antlers in the Siamese Museum.

Distribution. India, Ceylon, Assam, Burma, Siam, Hainan, Malay Peninsula; probably also parts of China, Formosa, Philippines, Borneo, and Sumatra.

N.B.—*CERVUS AXIS* Erxl. The Chital, or Spotted Deer.

Axis maculata, Cantor, p. 62.

Cervus axis, Blauf. Faun. Ind., Mamm. p. 546.

Cantor says this deer is called "Rúsa Búnga" by the Malays of the Peninsula, and "It is numerous in Keddah, and at present in Pinang. But it did not inhabit Prince of Wales' Island (*i. e.* Pinang) till one of the last Governors of the late Presidency took the trouble of importing from Bengal some pairs, which were kept in the park adjoining Government House (Suffolk House). When the Presidency of Prince of Wales' Island was abolished, the deer of the quondam Governor's park found their way into the jungle, where they have multiplied to a prodigious extent." Nowadays they have disappeared from Penang, and it seems Cantor must have been mistaken in recording them from Kedah; the local Malays assured me no spotted deer existed there.

¹ A Sambar born in 1899 in the Ghizeh Zoological Gardens (original locality of parents unknown) had at first a very distinct black vertebral line from between the ears to the tail.

150. *CERVUS PORCINUS* Zimm. The Para, or Hog-deer.

Cervus porcinus, Blanf. Faun. Ind.. Mamm. p. 549, fig. 179 (p. 550).

The Siamese Museum contains two stuffed males, obtained in Siam, but the exact locality I was not able to discover.

Distribution. Parts of India, Ceylon, Burma, Siam, and Laos States of Cambodia (R. Ward, 'Records Big Game,' 1899, p. 71).

Family TRAGULIDÆ.

151. *TRAGULUS JAVANICUS* (Gmel.). The Smaller Malay Mouse-deer.

Tragulus kanchil, Cantor, p. 60; O. Thomas, P. Z. S. 1886, p. 17.

Tragulus javanicus, Blanf. Faun. Ind.. Mamm. p. 556.

"Kra-chong" of the Siamese.

"Kanchil" or "Pelándok" (pronounced "Plando") of the Malays.

Cantor says this "species is astonishingly numerous" and occurs in the Malay Peninsula, Penang, Singapore, and the Lencary Islands; he adds "In Prince of Wales' Island (*i.e.* Penang) any number may be procured within short notice, at the rate of one Spanish dollar per dozen."

Oldfield Thomas (*l. s. c.*) records specimens from Salanga, Junkceylon, from Taroar, from Klang, Selangor, and from Singapore Island.

Ridley (J. S. B. R. A. S. no. 25, 1894, p. 60) records this species from Pahang.

There are specimens from Larut in the Museum at Taiping, and from Selangor in the Museum at Kuala Lumpur. Hanitsch records it from Changi, Singapore (Rep. Raffles Libr. & Mus. 1898, p. 9).

This species occurs in Siam; there is a specimen from the Dong Phya Fai in the Siamese Museum; and A. Milne-Edwards ('Recherches Famille Chevrotains,' Paris, 1864, p. 78) says "en 1862, M. Bocourt en a rapporté au Muséum un individu du royaume de Siam, et le Musée britannique en possède un exemplaire provenant du Camboge."

Distribution. Tenasserim, Siam, Cambodia, Cochinchina, Malay Peninsula (Junkceylon, Lencary, Penang, Perak, Selangor, Pahang, Singapore), Sumatra, Java, Borneo.

152. *TRAGULUS NAPU* (F. Cuv.). The Larger Malay Mouse-deer.

Tragulus javanicus, Cantor, p. 61.

Tragulus napu, Blanf. Faun. Ind.. Mamm. p. 557.

"Nápu" of the Malays.

Cantor records this species from the Malay Peninsula, where he says it "appears to be far less numerous than the preceding."

W. L. Slater (Cat. Mamm. Ind. Mus. ii. 1891, p. 191) records two specimens from the Malay Peninsula, obtained in 1871 and 1872.

Ridley (J. S. B. R. A. S. no. 25, 1894, p. 60) records this species from Pahang, and (Nat. Science, vi. 1895, pp. 163, 164) says this is the commonest species of Mouse-deer in the Peninsula, and gives an interesting account of its habits in confinement and of native methods of catching it. There are specimens from Larut in the Museum at Taiping, and from Selangor in the Museum from Kuala Lumpur.

Distribution. Tenasserim, Malay Peninsula (Perak, Selangor, Pahang), Sumatra, Java, and Borneo.

N.B.—*TRAGULUS STANLEYANUS* Gray. Stanleyan Chevrotain.

W. L. Slater (Cat. Mamm. Ind. Mus. part ii. 1891) records two specimens from the Malay Peninsula, obtained in 1870. This species is by some supposed to occur in Singapore, perhaps from a statement by A. Milne-Edwards: "Un individu né le 25 septembre 1862, à Singapore, de Chevrotains de Stanley achetés par M. Bocourt pour le Muséum" ('Recherches Famille Chevrotains,' p. 81, Paris, 1864). I do not know the real habitat of this species, but have been told that it occurs in the Dutch islands south and south-east of Singapore, and is imported into Singapore from Rhio.

Family SUIDÆ.

153. *SUS CRISTATUS* Wagner. The Indian Wild Boar.

Sus indicus, Cantor, p. 53.

Sus cristatus, Blanf. Faun. Ind., Mamm. p. 560.

"Mu" of the Siamese.

"Babi utan" of the Malays.

Cantor records wild swine from the Malay Peninsula, Penang, Singapore, and the Lancy Islands. Ridley (J. S. B. R. A. S. no. 25, 1894, p. 60) says wild pig are common in the low country of Pahang, and were also seen far up the Tahan; and (Nat. Science vi. 1895, p. 161) records them from the island of Singapore, where he says they are "far too abundant."

There are local specimens in the Museums at Taiping, Kuala Lumpur, and Singapore.

In 1896 wild pigs were still to be found in both Penang and Singapore. In 1897 I saw one that had been killed the day before near Gunong Pulai, Johore; I was doubtful whether it was *S. cristatus* or not, owing to the greatly elongated facial portion of the skull, which unfortunately I could not bring away, my companions being Mahomedans, and I having too many other things to carry myself. In June 1898 I saw two wild pigs in swamps beyond Jenan, Kedah; apparently the ordinary *S. cristatus*.

Distribution. India, Ceylon, Burma, Lower Siam, Malay Peninsula.

Order CETACEA.

Family BALÆNIDÆ.

154. MEGAPTERA BOOPS. Humpbacked Whale.

Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9) says there is an incomplete skeleton of this species from Malacca in the Raffles Museum. I believe it was obtained in October 1891.

Family DELPHINIDÆ.

155. PHOCÆNA PHOCÆNOIDES (Cuv.). The Little Indian Porpoise.

Phocæna phocænoides, Blanf. Faun. Ind., Mamm. p. 574, fig. 187 (p. 575).

Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9) records "*Neomeris phocænoides*" from Singapore. In the Museum at Taiping there is a stuffed specimen caught off Matang, Perak, about 46 inches (say 1168 mm.) in total length, apparently of this species.

Distribution. Indian Ocean, from Cape of Good Hope to Japan (Blanf. *op. cit.* p. 575).

156. ORCELLA BREVIROSTRIS (Owen). The Larger Indian Porpoise.

Orcella brevirostris, Blanf. Faun. Ind., Mamm. p. 571, fig. 189.

"Lomba-lomba" of the Malays.

The British Museum contains a stuffed specimen from Singapore (Flower, List of Cetacea, 1885, p. 17), from whence it is also recorded by Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9). In the Museum at Taiping there is a stuffed specimen, caught off Matang, Perak, about 60 inches (say 1524 mm.) in total length, apparently of this species.

Distribution. Bay of Bengal, Singapore, North Borneo.

157. STENO PLUMBEUS (Dussum.). The Plumbeous Dolphin.

Steno plumbeus, Blanf. Faun. Ind., Mamm. p. 583.

Cantor (p. 66) says *Delphinus plumbeus* occurs on the coasts of Penang, is called "Parampúan Laut" by the Malays of the Peninsula, and "the species, although very numerous, and rather heavy in its movements, is rarely captured, except by chance in fishing stakes."

In the Museum at Taiping there are three stuffed specimens, from the coasts of Perak, probably of this species; the largest is about 78 inches (say 1980 mm.) in total length.

Distribution. Indian Ocean.

158. DELPHINUS DELPHIS L. The Common Dolphin.

Delphinus delphis, Blanf. Faun. Ind., Mamm. p. 587, fig. 182.

Recorded from Singapore by Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9).

Distribution. "Probably all tropical and temperate seas" (Blanford).

Dolphins are numerous on both sides of the Malay Peninsula and in the Gulf of Siam. I have from time to time seen three, apparently different species, but have never managed to secure any specimens; one of these is *D. delphis*, one a smaller species, and one larger than *D. delphis*, with a very prominent dorsal fin.

Local sailors report seeing a "white porpoise" at Belawan Deli, on the east coast of Sumatra, and at the mouths of several rivers in the Straits of Malacca.

Order SIRENIA.

Family MANATIDÆ.

159. HALICORE DUGONG (Erxl.). The Dugong.

Halicore indicus, Cantor, p. 66.

Halicore dugong, Blanf. Faun. Ind., Mamm. p. 594, fig. 196.

"Dúyong" or "Parampúan Laut" of the Malays of the Peninsula, *apud* Cantor.

I have in my possession a beautifully finished pencil drawing of "A young male Dūyōng taken in the neighbourhood of Singapore in April 1837. Measuring in length from the tail to the nose on the back 7 ft. 4 in. A Commander of a Portuguese ship trading to China says that in Portuguese this Fish or Animal is called 'Pexi Mulher' (literally Woman Fish)—he had seen them at Palaos in the Pacific. The bones of the jaws, the top of the scull and the throat are much esteemed there, especially those of the jaws which are of value and used as ornaments by the Natives, who are Savages." This note and the drawing are unsigned, but are stamped "Pinang, 4 Ja. 1838, Post-Office."

Cantor says: "The Duyong appears not to be numerous at Singapore, still less so to the Northward, and has but in few instances been observed in Kwála Múda, the mouth of the river, which forms the northern boundary of Province Wellesley."

Horsfield (Cat. Mamm. Mus. East India Co. 1851, p. 139) records a Dugong's skull "from Finlayson's Collection, Siam."

Ridley (Nat. Science, vi. 1895, p. 165) says "The Dugong is tolerably common in the Strait between Johore and Singapore; but one does not often see it," and gives some information about it.

Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9) records a specimen from Malacca. In July 1898 I saw one in the Raffles Museum labelled Singapore.

Mr. L. Wray told me in 1896 he believed the Dugong was not found on the coast of Perak, probably owing to the lack of seaweed.

Distribution. Shores of the Indian Ocean, Straits of Malacca, and coasts of Borneo.

Order **EDENTATA.**Family **MANIDÆ.**

160. **MANIS JAVANICA** Desm. The Malay Scaly Anteater.

Manis javanica, Cantor, p. 51; Blanf. Faun. Ind., Mamm. p. 599, fig. 199 (p. 600).

"Nim" of the Siamese.

"Pengóling" or "Pangolin" of the Malays, according to authors.

"Tangíling" of the Malays.

Cantor records the *Manis* from Penang and the Peninsula, and says:—"Although numerous in rocky situations, is not often captured, as it is seldom abroad till after sunset. The largest male measured from the apex of the nose to the root of tail one foot nine and a half inches (546 mm.); the tail one foot eight inches (508 mm.)." Ridley (J. S. B. R. A. S. no. 25, 1894, p. 60) records it from Pramau, Pekan, in Pahang; and (Nat. Science, vi. 1895, p. 165) says: "It is frequently found in open sandy country, making large burrows in the ground," and remarks on its habits. In the Museum at Taiping there are several specimens from Larut, Perak, and in the Museum at Kuala Lumpor specimens from Selangor. Hanitsch (Rep. Raffles Libr. & Mus. 1898, p. 9) records this species from Singapore. There were three specimens from Siam in the Museum at Bangkok, the largest, as stuffed, was 3 feet 4½ inches (say 1028 mm.) in total length.

In April 1896 I saw a female and young one alive in Penang, said to have been just caught in the hills on the island. Mr. F. H. Malcolm Staples told me (Sept. 1897) that he once got an Anteater at Batu Pahat, Johore; they ate it and found it good. In June 1897 I saw the skin of a specimen that had been just killed at Ayuthia, Siam; this was in a flat alluvial plain, with no rocky hills within many miles. In January 1898 we got two specimens at Chantaboon, both caught by natives; one was brought in alive, but it died in nine days. In May 1898 we got a live one in Kedah, which also died in nine days. In each case we could not get them to feed; at night they were turned loose in the lower part of the house (where ants and innumerable other insects abounded), to forage for themselves, but I never observed them even attempting to eat. They were the least intelligent animals I have ever kept; they wandered about the house a great deal at night, and one we let walk in the garden so as to watch it in the moonlight: they showed no inclination to dig or search for food, but walked on till they came to an obstacle, when they proceeded to climb up it; if, for instance, it was a chair, they climbed on to it, then on to the back, and then fell off the other side, and continued walking as before. The prehensile tail is very difficult to detach once the animal has coiled up round one's arm.

Colour. Kedah specimen, ♂, uniform dark brown, except end of tail which is buff. Naked skin of feet pink.

This specimen had sixteen rows of scales round the middle of its body, and measured :—

	ft.	in.	mm.
Length, head and body	1	8	508
„ tail	1	3½	394
„ ear		$\frac{3}{4}$	19
„ hind foot, without claws . .	3		76

Distribution. Sylhet to Burma, Siam, Cochinchina, Cambodia, Malay Peninsula (Penang, Kedah, Perak, Selangor, Pahang, Johore, Singapore), Sumatra, Java, Borneo, Celebes.

Popular beliefs. It is not surprising that strange stories are related about an animal like the Manis. One that I was told in Kedah is worth putting on record. It, says the Malays, is very clever catching ants; putting all its scales at right angles to its body, it lies perfectly motionless on the ground: ants, thinking it dead, swarm over it by thousands, then it suddenly shuts down all its scales, thus imprisoning the ants, and rushes into a pond: under water it again opens its scales, the ants float to the surface, and the wily Manis licks them up comfortably.

2. On a remarkable Piece of Skin from Cueva Eberhardt, Last Hope Inlet, Patagonia. By Dr. EINAR LÖNNBERG, University of Upsala.¹

[Received March 6, 1900.]

Last year Mr. Erland Nordenskjöld visited Last Hope Inlet, Patagonia, to make further explorations in the large cavern, Cueva Eberhardt, which has become famous for the interesting remains of animals found in the deposits covering its floor. He has recently published the results of his researches in a memoir read before the Royal Swedish Academy of Sciences²; but in addition to the remains of which he treats there is also a remarkable piece of skin of an unknown animal, which he has kindly entrusted to me for description. This specimen was found by Mr. Nordenskjöld in the oldest stratum on the floor of the cavern, which is chiefly formed of the excrement of the giant-sloth *Grypotherium*, and is sometimes covered with a thin layer of sulphate of magnesia 30 to 50 mm. in thickness. The discoverer informs me that it was found close to a scapula, a claw, and some other bones of *Grypotherium*, and also near a tooth of *Felis onca*. It is therefore probable that the animal to which the skin belonged was contemporaneous with *Grypotherium* and the other members of the Pampean fauna.

Mr. Nordenskjöld informs me that when the piece of skin was

¹ Communicated by A. SMITH WOODWARD, F.Z.S.

² E. Nordenskjöld, "Iakttagelser och Fynd i Grottor vid Ultima Esperanza i sydvestra Patagonien," K. Vetensk.-Akad. Handl. vol. xxxiii. no. 3 (1900).

Fig. 1.



The piece of skin from Cueva Eberhardt.

found it was rolled up like a ball ; but by moistening the specimen he was able to unwrap it and stretch it into the form shown in the accompanying photograph (see fig. 1, p. 380). It measures about 0·15 m. in length, but its breadth varies between 0·05 m. and 0·015 m. Its thickness, where stretched, is quite 0·002 m. : where contracted, somewhat greater. It is very densely covered with hair of a

Fig. 2.



Micrographic reproduction of some of the hairs of the piece of skin.

reddish-brown colour, redder than the coloration common in cattle and perhaps best described as fox-red. The hair seems to be a little more shiny than that of a fox, and occasionally it appears to be bleached to a pale yellow. It is, however, uncertain whether the paler spots are original or due to accident : it can only be said that they are probably original, because the paler tufts and single

hairs exhibit the same shade from their tips to their roots, and closely mingle with the completely red hairs. The length of this hair is different in different parts. Where it is longest it measures a little more than 0·045 m., but in some places 0·03 m. to 0·025 m. or even less. The hair is laid in different directions, as seen in the figure, and cannot have formed a smooth covering on the animal. The size of the individual hairs is variable, but there is no typical wool or underfur. The thickest hairs (fig. 2, p. 381) measure 80–100 μ in optical section, but taper gradually towards both ends. They are flattened and wavy. The medulla occupies the largest part of the hair, so that the cortex does not measure more than 10–13 μ in optical section; but towards the root the medulla becomes scantier and is finally completely broken up. The thinner hairs cannot be classified as wool or underfur. Their diameter in optical section varies from 45 to 55 μ . Their structure is exactly the same as that of the coarser hair. They are flattened and wavy, gradually tapering to a tip which has no medulla; but their stem exhibits a large medulla, so that the cortex of that part usually measures only 8–10 μ . The cortex is, as a rule, thicker on one side, and the cuticle covering it is scaly, so that the edge of the optical margin assumes a more or less distinct serrated appearance. The finer hairs are about ten times as numerous as the coarse hairs; and on the skin the coarser hair is not very conspicuous, the less so as intermediate sizes can also be seen.

In attempting to determine to what animal the piece of skin thus described may be referred, it is necessary first to consider the mammals of which remains have been found in the same stratum as this specimen. Of these, of course, *Grypotherium* is at once excluded, neither the structure of its skin nor that of its hair admitting of any comparison. The Guanaco may also be dismissed at the same time, since its fine wool or fleece bears no resemblance to the hair of this skin, as shown even by Guanaco remains associated with it. The large Cat of Cueva Eberhardt has been identified by Erland Nordenskjöld (with the concurrence of the eminent Danish zoologist, Herluf Winge) as a large variety of *Felis onca*¹. If this great extinct Jaguar had the same black-spotted appearance as the recent one, it is most improbable that so large a piece of skin should have been preserved without any black hairs remaining attached to it. If, however, the extinct Jaguar had a different fur-colour, it may be assumed, with a high degree of probability, that the structure of its furry covering was similar to that of the recent Jaguar. But the fur of the latter is distinguished from that of this piece of skin very readily by being shorter and having a fine underfur. This underfur of the Jaguar does not measure more than 15–30 μ in optical section, and has quite another structure, being completely devoid of a central

¹ This is the animal called by Santiago Roth "*Yemisch listai*" ("El Mamífero misterioso de la Patagonia *Grypotherium domesticum*," } or Rodolfo Hauthal, Santiago Roth & Robert Lehmann-Nitsche, Revista Mus. La Plata, vol. ix. 1899 p. 441).

medulla, or at least with the medulla broken up in scattered minute portions. The coarse hair of the Jaguar is also different from that of the problematical piece of skin, in having a thicker cortex and a less developed medulla. Since all the present South-American cats (Jaguar, Puma, Ocelot, &c.) have an underfur, it may be assumed that the extinct Jaguar also had such an underfur, the more so as it lived further south in a region with a more inhospitable climate than that of the native country of most South-American cats. If such were the case, this piece of skin cannot have belonged to that extinct cat or to any other allied species. Similarly the species of *Canis*, probably a close ally of *C. magellanicus*, may be excluded from comparison, because, like other wolves and foxes, it must have been provided with an underfur. The skin is too thick to have possibly belonged to any of the rodents of which remains have been found in this or other layers of the cave. There thus remain only two kinds of animals of which fragments occur in the same layer as that in which the piece of skin was found, namely *Macrauchenia* and *Onohippidium*. The first of these, however, is very sparingly represented in Erland Nordenskjöld's collection, perhaps only by a phalangeal bone, and Dr. Hauthal has not found anything which could be referred to the same animal. *Onohippidium*, on the other hand, occurs abundantly. This peculiar horse, with its large fossa lachrymalis, which can be seen very well in one of Nordenskjöld's specimens, has thus in one way or the other been very often brought into the cave. It seems, therefore, quite probable that the piece of skin now described may have belonged to the now extinct *Onohippidium*.

To determine more precisely the mammal to which this piece of skin belonged, it is necessary to extend comparisons to other animals still living in the neighbourhood. For reasons already mentioned, the Puma, species of *Canis*, Guanaco, and the small rodents are at once excluded. The Viscacha (*Lagostomus*) has too soft a fur and too thin a skin to be taken into consideration. The characteristic structure of the hair of the deer (*Cervus chilensis*) makes every comparison with this animal impossible. In the same way, every mammal native to the South-American soil must be rejected. For the sake of completeness, however, the domesticated cattle and horses must also be included in the discussion, although it is extremely improbable that a piece of skin of either of these animals would find its way into the deepest layer of the cave-deposits. I have thus made a comparison of the hair with that of the domesticated ox and horse. The microscopical structure of the hair of cattle is different from that of the supposed *Onohippidium*. The cortex of the hair of the former is much thicker compared with the medulla than in the latter. At least in Scandinavia, it is also to be noted that the cattle have an underfur of fine hairs without medulla; and I suppose that the cattle of Patagonia, which run half wild without protection against the roughness of the climate, must be similarly provided. The hair of a horse is coarser and stiffer and does not show the same

scaly cuticle. It is also noteworthy that not even the winter-coat of a horse in Scandinavia approaches in denseness that of the supposed *Onohippidium*; while there are other differences more easily seen than described.

Taking all circumstances into consideration, I think we must return to the above suggested theory, that the specimen now under discussion is a piece of skin of an *Onohippidium*. If that be correct, it is of course very interesting to have a fragment of the soft parts of a second animal, long ago extinct, from the Cueva Eberhardt.

The detailed statements of Erland Nordenskjöld as to the extreme dryness of those parts of the cave where these remains were found, and the protecting layer of sulphate of magnesia, give a plausible explanation of the organic substances (even flesh on some bones) having been so excellently preserved for such a considerable time. I may add that Professor Lagerheim has also made attempts to find bacteria in the faecal material, but failed to discover any¹.

3. On a remarkable Attid Spider from Borneo, *Mantisatta trucidans*, n. g. et sp. By CECIL WARBURTON, M.A., Christ's College, Cambridge.

[Received March 31, 1900.]

By the courtesy of Dr. Sharp I am able to describe a very interesting new Spider found in a collection of insects, chiefly Termites, made by Dr. G. D. Haviland in Sarawak, Borneo. The Spider was overlooked on first going over the collection, and unfortunately no note was made of the particular insects with which it was associated, and nothing is certainly known with regard to its habits.

Fam. ATTIDÆ.

Subfam. LYSSOMANÆ.

Genus MANTISATTA, n. gen.

Body elongated and depressed. Eyes arranged as in *Lyssomanes*. Spinnerets beneath the posterior end of the abdomen, which is produced beyond them into a caudal process. Legs of the first pair much the most strongly developed, with strong forwardly directed spines under the tibia and backwardly directed spines

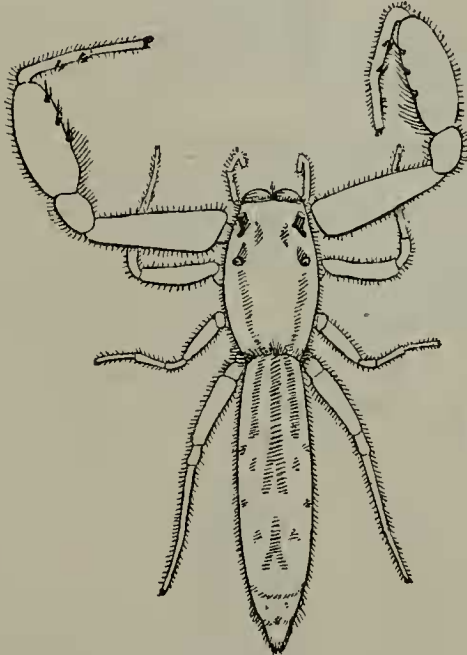
¹ After the reading of this paper, Dr. W. G. Ridewood remarked that he had examined the microscopic structure of the hair of the two equine hoofs found in association with *Grypothorium* by the La Plata Museum expedition. He had observed in the hairs attached to these hoofs the tapering of the hair at each end, the scaly cuticle, and the excentric position of the relatively large medulla, which had been described as characterizing the hair of the problematical skin found by E. Nordenskjöld.

under the metatarsus, forming a prehensile weapon when these joints are apposed.

MANTISATTA TRUCIDANS, n. sp. (Fig. 1.)

Female. Total length 4 mm. ; length of thorax $1\frac{1}{2}$ mm. ; length of abdomen $2\frac{1}{2}$ mm. Greatest breadth of thorax (about the level of the second pair of legs) about 1 mm. ; of the abdomen about .75 mm.

Fig. 1.



Mantisatta trucidans, ♀, much enlarged.

The cephalothorax is much depressed and is about half as long again as broad. The first pair of eyes are very large, occupying the whole breadth of the facies, and are mounted on short cylinders which project forward. The second and third pairs of eyes are on confluent dark-coloured eminences. The second eyes, which are pale-coloured, are about a quarter of the anterior eyes in diameter. The third eyes are very small and black. The fourth pair of eyes, somewhat farther behind the third pair than these are behind the second, are dark and moderately large, their diameter being about one third of that of the anterior eyes. The whole ocular area (fig. 2, p. 386) forms almost an exact square.

The abdomen is a depressed cylinder, more than three times as long as broad. The spinnerets are not visible from above, being hidden by a caudal process (fig. 3, p. 385).

The anterior legs are about as long as the whole animal, the femora, patellæ, and tibiæ being very strongly developed, and giving

the Spider a chelifer-like appearance. Beneath each tibia, towards its distal end, are three pairs of strong black spines, directed forward. The metatarsus, which can be closed upon the tibia, bears two pairs of shorter black spines directed backward. One pair is beneath the middle of the joint, and the other near its distal extremity.

Fig. 2.

Ocular area of *Mantisatta trucidans*.

Fig. 3.

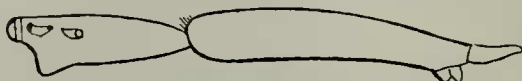
*Mantisatta trucidans* in profile.

Fig 4.

Under surface of anterior part of *Mantisatta trucidans*, with enlarged view of epigyne.

The other legs (4, 2, 3) are small and weak, and do not appear to be adapted for leaping.

The whole Spider is exceedingly pale—almost white—in colour, at all events as it appears after immersion in spirit. Dorsally it is variegated by a pattern marked out in faint dusky lines and dots. On the cephalothorax there are two dark patches between the third pair of eyes, and the second, third, and fourth pairs of eyes are on

black eminences. Behind the fourth pair commence two faint dusky lines, which converge slightly as they approach the abdomen, along which they are continued for nearly a third of its length. Along the first half of the abdomen there is a median line, forking posteriorly. This is succeeded by a shorter line which forks similarly, and behind this there is a transverse line. On each side of the central marking there are a series of dots, the distribution of which is shown in fig. 1. The body is thinly pubescent. The under surface of the body is whitish except the small yellow-brown epigyne (fig. 4).

The legs are similar in colour, and, except for the spines on the tibiæ and metatarsi of the first pair, are furnished only with a thin clothing of hairs. All exhibit black scopulæ on the tarsi.

Male unknown.

A single adult female was found among a collection of insects made by Dr. G. D. Haviland in Sarawak. Nothing is known of its habits, but from the nature of the collection it is probable that it was found inside a termites' nest. Its structure would suggest that it does not pounce upon its prey in the usual *Attid* fashion, but that it remains still and seizes passing insects with its predaceous front legs.

4. On Geographical and Individual Variation in *Mus sylvaticus* and its Allies. By G. E. H. BARRETT-HAMILTON, F.Z.S.

[Received March 2, 1900.]

(Plate XXV.)

This paper contains some account of the various local forms or subspecies of the Long-tailed Field-mouse, which can be recognized from the material at present available in the collections of the British Museum of Natural History.

The accusation has sometimes been brought against certain recent workers on Mammals that their papers are "scrappy." I fear that those who lightly make such assertions can have but little idea how insignificant is our present knowledge of the local variations of Old World mammals, and how numerous are the new facts constantly being brought before us with the consequent need for their permanent record. Even in the case of one of our commonest mammals, such as that here under consideration, a careful study of material, which is probably both greater in quantity and better in quality than that which has come before any other writer, chiefly impresses one by its inadequacy to afford the basis of anything like a full account of the variations of the animal even in such a small area as that of the British Isles.

It is a curious sign of the times that in this country, at all events, the naturalist who wishes to give some account of the local variations or subspecies of any particular mammal must commence

with an apology for the work in which he is engaged. So long as the field of enquiry be entomology, the attempt to describe and classify local variations, and to gain some knowledge of the guiding principles which underly them, is regarded with respect. If, on the other hand, a zoologist attempts to institute a similar inquiry respecting mammals, he is regarded with suspicion, or often as a mere species-monger who wishes to burden the compilers of local faunas with the names of a number of forms, the status and relationships of which only a long study will help them to thoroughly understand. Yet modern investigations have clearly shown the existence of a rich crop of local variations amongst the Mammalia, not less worthy of study than those found amongst the Lepidoptera or Mollusca, and which I hold it to be clearly the business of systematic zoology not only to describe and to arrange, but to name.

In treating a species well known and long recognized, such as *Mus sylvaticus*, I prefer to regard as subspecies all forms which can be identified as in any way phases or representative modifications of the original type as known to Linnaeus. The method, so much in favour in America, whereby all forms which intergrade are looked upon as subspecies, and all those which do not are regarded as species, has much to recommend it; but the simple ascertainment of the fact that intergradation does, or does not, occur alone implies a greater knowledge and an ampler series of specimens than we, in the Old World, possess of many of the very commonest mammals. Further, by its unavoidable multiplication of species it obscures the relationship of kindred species and genera, and necessitates the formation of new genera or subgenera to include the various groups of new species and subspecies. Under this system many, if not all, of our time-honoured Old World species would be raised to the rank of full genera—a contingency which may be eventually necessary, but which it seems desirable to postpone to as late a date as possible.

On the other hand, the system used in this paper has the advantage of roughly indicating the relationship of the forms dealt with. We do not, however, thereby escape from the difficulty that these forms are of widely different degrees of distinctness. For instance, whereas some of our western subspecies approach each other closely, even in their extreme phases, and will probably be found to intergrade freely, there are others, such as *Mus sylvaticus princeps* or *M. s. draco*, which, even if they be proved to intergrade, are in their extreme phases highly distinct and at once recognizable. Some forms there are, however, which, having been long separated from the parent form, have become so differentiated that the most stubborn disregarder of local variations could not consider them to be identical with *M. s. typicus*. Such is *M. argenteus* of Japan. To it accordingly, lest my judgment should be found erring in allying it too closely with *M. sylvaticus*, I here accord full specific rank.

A further advantage may be claimed for the method which is

here advocated, namely, that it does not add to the difficulties of the student of the geographical distribution of mammals in its broadest and widest sense. The numerous modern species, although they may be of the greatest interest to the student of the fauna of a single or of a particular group of countries, cannot but be a source of perplexity to the naturalist, whose aim it is to regard the mammals of the world as a whole. To the latter the liberal and intelligent use of trinomials must be a boon, rendering possible as it does a ready comprehension of the origin and relationship of any particular local or representative form which he may have before him.

But, after all, the main object of our study should be the variations of the animal or group of animals dealt with. Provided that this be our aim, the exact method we employ is surely of subsidiary importance. No method that does or can exist, unless it be diagrammatic or pictorial, is capable of fully or satisfactorily exhibiting the variations which have to be dealt with.

Distribution.—The distribution of *Mus sylvaticus*, speaking of it in a broad sense as including all its subspecies, is, as I have already pointed out¹, almost coterminous with the limits of the Palearctic Region, in which it is probably as widely spread as most other mammals, since it seems to be comparatively regardless of the influence of temperature and is found far up the slopes of the mountains. Thus Dr. G. Radde² met with it almost everywhere in his journeys in South-western Siberia, and it is especially common on the middle Amoor. He remarks that there can be no doubt that it is found, at least locally, in the regions lying between wooded Dauria and Lake Baikal, at all events in the grassy country, but that it is absent from the high steppes of Mongolia. In these regions it avoids swampy and shaded localities, but loves sunny slopes with sparsely distributed high woods, where it gladly gathers the dry windfalls for its nest. With these exceptions, to which must be added the deserts and arctic tundras, it is equally at home in all the countries between the eastern coast-line of China and the Atlantic sea-board of Ireland or Portugal. It has reached nearly all the outlying portions of the Region, such as Morocco, Algeria, Palestine, Corsica, Sicily, the Balearics, the Channel Islands, Great Britain, the Isle of Man, Ireland, the Scotch Islands³ (such as the Inner Hebrides, where it is abundant on all the islands), the Outer Hebrides (including even remote St. Kilda⁴), the Shetlands, and Iceland, and in the last locality its local representative, if indigenous, is the only species of mammal that is so. On the other hand, I have seen no specimen from any of the Japanese islands, where, however, I believe, that on Nippon *Mus argenteus* is its modified

¹ Proc. Zool. Soc. Feb. 7, 1899, p. 82.

² 'Reisen im Süden von Ost-Sibirien in den Jahren 1855-1859 incl.' Band i. pp. 180-182 (1862).

³ J. A. Harvie-Brown & T. E. Buckley: 'Vertebrate Fauna of Argyll and the Inner Hebrides,' 1892, p. 38.

⁴ I have as yet seen no specimen from either the Orkneys or the Faroes. It doubtless occurs on the former; the case of the latter will be discussed below.

representative, and I could not hear of it in Kamchatka; but its absence from the latter country is not surprising when it is considered that the peninsula, as shown by its general fauna, has probably been isolated as an island until recent times, and further that we are not aware of the presence of *Mus sylvaticus* in the two main roads thither, in Chukechiland or the Kuril Islands.

In Asia Minor it was found by Ménétries amongst the mountains of Talyche, by Canon Tristram on the plains of Palestine, and Danford caught a specimen "while running about on the surface of the deep snow," considerably above the tree-growth¹. As a contrast to this, one has been trapped by Mr. G. H. Caton Haigh in Wales among the rocks on the shore near the mouth of an estuary, so that it seems equally at home in extremely varied localities.

In spite, however, of its wide distribution and comparative disregard of extremes of climate and environment, it is one of those mammals which do not seem to have reached Tunis, Tripoli, or Egypt.

The southern boundary of its range in Asia is uncertain. It has been reliably recorded from Wakhán on the Upper Oxus; from Kashgar, in Eastern Turkestan; from Gilgit in the Upper Indus Valley; from Cherra Punji, India; from Kashmir; and from Kuatun, in North-west Fokien, Eastern China. It thus reaches the confines of the Oriental Region at more than one locality.

Its presence in such isolated, yet widely separated, islands as Iceland and Corsica (if, indeed, it be native in the former), seems to mark it as a species which has for long maintained a wide area of distribution, and which is of sufficient age to have already occupied the greater part of its present geographical range when the British Islands and their appendages, at least as far as the Shetlands, Outer Hebrides, St. Kilda, and Ireland, still formed part of the Continent of Europe, and when there existed a free land-passage from Europe to North Africa by means of substantial land-bridges where now only islands remain. Japan alone seems to be old enough to have given it time for specific modification. This supposition gains support from the fact² that its bones have been found in numerous caves on the Continent as well as in the English Forest-Bed of Norfolk, and elsewhere, as in the Ightham Fissures of Kent, and that we have no trace of its ancestry, the Pleistocene species *Mus orthodon* Hensel and *Mus lewisi* E. T. Newton³ being at least as highly specialized as itself.

The question as to whether this Mouse could be indigenous to Iceland I left an open one, since it seems likely that the connection between that island and the Shetlands must have been of far more

¹ Proc. Zool. Soc. 1877, p. 279.

² See A. Nehring's "Uebersicht über vierundzwanzig mitteleuropäische Quartär-Faunen," Zeitschr. d. deutsch. geol. Gesellsch. Bd. xxxii. 1880, pp. 468-509; also Brandt & J. N. Woldrich's "Diluviale europäisch-nordasiatische Säugethierfauna und ihre Beziehungen zum Menschen," Mém. Acad. Imp. Sci. St. Pétersbourg, xxxv. I. p. 69 (1887).

³ Quart. Journ. Geol. Soc. vol. I. pt. 2, no. 198 (May 1, 1894).

remote date than that between the British Islands and the Continent, and, moreover, we do not know whether this Mouse occurs on the Faroes or not. Its occurrence in these intermediate localities would afford support to the presumption that it is native in Iceland; but I am indebted to Col. H. W. Feilden for the information that the existence of an indigenous mammal of any kind on the Faroes is very unlikely, since they have undergone an intense, although local, glaciation at a period long subsequent to their present condition as islands.

At all events, *Mus sylvaticus* is perhaps the species *par excellence* of all others inhabiting the Palæarctic Region which we should most expect to find in such an out-of-the-way island as Iceland.

Material examined.—The following is a summary of the material which I have been able to examine. Not only have I had before me the specimens included in my own collection, but the whole of those now in the British Museum have been generously placed at my disposal by the authorities. In addition to these Mr. Gerrit S. Miller, Junior, Assistant Curator of Mammals at the United States National Museum, Washington, D.C., has most kindly sent over for my examination 66 examples from the collection in that museum. I have thus had before me a series of, in all, about 580 specimens, many of them prepared in the best modern methods and having also attached to them carefully cleaned skulls.

From England and Wales I have seen 171 specimens¹: from Bedfordshire 2, Cambridgeshire 3, Carmarthenshire 6, Cheshire 9, Dorset 1, Glamorganshire 11, Gloucestershire 6, Herefordshire 33, Hertfordshire 3, Isle of Wight 8, Kent 4, Leicestershire 13, Lincolnshire 2, London District 13, Merionethshire 5, the New Forest 5, Northants 2, Northumberland 6, Oxfordshire 18, Staffordshire 3, Suffolk 4, Surrey 5, Sussex 5, Warwickshire 2, Worcestershire 1, Yorkshire 1.

Turning to Scotland and its Islands, I have seen 56 specimens: from Cromarty 11, Edinburgh 2, Elgin 17, Haddingtonshire 2, Lanarkshire 1, and Skye 1; while Mr. Robert Henderson of Dunrossness, Shetland, has sent me 8 obtained there; and Mr. W. E. de Winton has kindly placed at my disposal his fine series of 14 from the Islands of Lewis and Barra.

From Ireland I have had before me about 45 specimens: from Carlow 7, Clare 2, Galway 4, Kerry 6, Tipperary 3, and Wexford several; and have also, through the kindness of my friend Dr. R. F. Scharff, been permitted to examine those in the Dublin Museum of Science and Art, among which are included

¹ For these the British Museum and myself are indebted to a numerous band of collectors, of whom I may mention Messrs. O. V. Aplin, A. S. Austen, E. W. H. Blagg, J. L. Bonhote, G. H. Caton Haigh, T. A. Coward, R. J. Cuninghame, G. Denoon, W. Dodson, J. S. Elliott, W. Evans, C. H. B. Grant, S. F. Harmer, F. W. Headley, the late Lord Lilford, Messrs. J. O. Mansel-Pleydell, W. R. Ogilvie Grant, Oldfield Thomas, Miss D. Sharpe, Mr. W. Taylor, Col. J. W. Yerbury, while, last but not least, my friend Mr. W. E. de Winton has placed his whole collection from various localities at my entire disposal.

(besides several specimens in alcohol) 7 skins from Co. Dublin and the north of Co. Wicklow, 7 from Co. Louth, two without locality, and an immature skin from Co. Galway.

From the Channel Islands I have a set collected by Mr. W. Eagle Clarke on Alderney¹; while from the Continent of Europe, its Islands, and North Africa, I have seen 169 specimens (which form part either of my own collection or of that of the British Museum of Natural History) from the following countries:—Morocco 11, Portugal 9, Spain (various localities) 10, France (various localities) 18, Belgium 10, Holland 5, Denmark 5, Scandinavia 6, Germany 60 (from various localities), Lithuania 1, Slavonia 16, Switzerland 11, Italy 4, Corsica 2, Sicily 2, Algeria 1, Roumania 44, Montenegro 1, Russia 1, Iceland 1. Lastly, there is the series of 66 specimens kindly sent over for my examination by Mr. G. S. Miller, Junior, which comprises 16 from Brunswick, Germany: 9 from Bergen, Norway; 2 from Upsala, Sweden; 17 from Switzerland; 17 from Warene, Belgium; and 5 from Cadillac-sur-Garonne, France.

Of Asiatic material I have examined 25 specimens from a number of localities, the most eastern of which is Kuatun, in North-west Fokien, China, whence Messrs. C. B. Rickett & J. D. La Touche have recently sent a fine series to the Natural History Museum.

General Remarks.—It is extremely hard to deal satisfactorily with the various phases of *Mus sylvaticus*. Considerable as has been the material at my command, far more so probably than has fallen to the lot of any other naturalist to examine, it is still impossible to trace out with anything like completeness the variations of this species even in Western Europe. *Mus sylvaticus* occurs everywhere in such abundance and is so easily caught that it might be thought that no animal would be easier to work out; but this is not the case, for in proportion to the very facility with which it is captured, a great deal of the material is young and untrustworthy. At present, therefore, I do not see my way to catalogue with anything like completeness the various recognizable subspecies and individual variations. All that I can do is to describe a few of the more extreme forms, leaving the majority of the intermediates for further consideration.

In dealing with the variations of an animal, we have two distinct types to treat of, viz., those which are spasmodic and affect only the individual, and those which are geographical and characteristic of all, or of the majority of, the individuals of a particular region or locality. The former do not directly concern the student of geographical variation; the latter are the species and subspecies, according to the degree of difference which they show, of a paper like the present one. The occurrence of startling variations, either individual or geographical, seems almost foreign to the constitution of *Mus sylvaticus*, yet it is not deficient in equally interesting, although less conspicuous, developments. In this respect, what I stated in my previous paper on the subject may still, broadly

¹ See Proc. Zool. Soc. Feb. 7, 1899, p. 82, footnote.

speaking, be regarded as true, although now naturally modified by recent accessions of material, so that I am able to distinguish local forms, for the proper differentiation of which, although I believe them to be perfectly recognizable and distinct, there was needed the accumulation of a considerable number of specimens.

Mus sylvaticus appears in fact to be a form which, in its long-standing and successful struggle for existence, has attained to a height of specialization from which it has either very little power of variation, or else which is such as to fulfil all the needs of the species in almost any conditions with which it may be brought into contact. The possible range of its variations, whether individual or geographical, would seem to be narrow. Within this narrow range, however, variation is very evident and perplexing. The animal, indeed, while apparently having small power of varying, uses to the utmost the power which it possesses. Unlike some of our common mammals, such as the Squirrel, Rabbit, or Rat, it is not subject to either melanism or albinism. In the whole series of the 'Zoologist' and the volumes of the 'Field' for the last twenty years, there is not to be found a single recorded instance of a well-marked sport of this species—a result which would have been very widely different had the object of the search been *Sciurus vulgaris*, *Talpa europæa*, or *Mus musculus*. This; of course, does not prove that conspicuous sports do not occur, but it undoubtedly emphasizes their rarity¹. I have not thought it worth while to supplement this result by a search for information, all of which would probably be of a highly negative character, through any number of the works of foreign writers; but neither in those of Bell² nor of J. H. Blasius³ can any allusion to such sports be found. Dehne⁴, however, mentions a variety, which he calls "die isabellfarbige Waldmaus," and which he characterizes as very rare, since he had only seen one example, and that in the summer of 1833 in the district of Penig. He had never seen white or otherwise coloured varieties. De Selys-Longchamps⁵ records an "Isabelle albine" variety with pink eyes, and states that such occur "très accidentellement." Similar isabelline, white, or white-speckled varieties are noted as of extremely accidental occurrence by Bonaparte⁶, Fischer⁷, and Mina Palumbo⁸. *Mus sylvaticus* is then, it seems, a good instance in support of Mr. A. Sedgwick's remarks⁹ on the loss of variability in an old species.

¹ It must not be forgotten also that sports of *Mus sylvaticus* may have been occasionally credited to *Mus musculus*.

² 'British Quadrupeds,' ed. 2 (1874).

³ 'Säugethiere Deutschlands,' 1857.

⁴ Allgem. deut. naturh. Zeit. 1858, pp. 182-3.

⁵ 'Études de Micromammalogie,' 1839, p. 65.

⁶ 'Fauna Italica,' 1832-1841, art. on *Mus sylvaticus*.

⁷ "Säugethiere des St. Petersburger Gouvernements," Der Zoologische Garten 1869, p. 340.

⁸ Cat. dei Mamm. della Sicilia, 1838, p. 72. See E. Cantoni's "Elenco Generale dei Mammiferi soggetti ad albinismo," in Atti della Soc. Ital. di Sci. Nat. vol. xxiii., 1880.

⁹ Presidential Address to Section D of British Association : Dover, 1899.

Within its own limits, as has been stated above, the Long-tailed Field-mouse is subject to considerable variation, but the variations are usually more subtle than are those of some other mammals. Thus, putting aside the influence of age and season, I find a good deal of individual variation in the amount and intensity of the rufous coloration of the upper surface and of the purity of the underside, in the presence or absence of a spot or band upon the breast, and in the length of the tail. Size too, as in other mammals, contributes its share to individual differences; and my tables at the end of this paper show that, after allowing for individual differences amongst the various persons who have measured the specimens which I have had under examination, there yet remains a considerable variation above and below the mean for adults. I think it highly probable that such variation would have proved distinctly less had the series from which my averages have been compiled been collected in a locality smaller than that of Great Britain as a whole. It is, in fact, possible that there is an increase in size of *Mus sylvaticus* even in Great Britain from south to north, or, perhaps, from south-west to north-east.

As regards geographical or local variations, *Mus sylvaticus* is, on the whole, remarkably constant to a single well-marked type. Throughout the Palearctic Region it is distinguishable at a glance from every other mouse with which it might possibly be confounded by the possession of a combination of characters, amongst which its size, the pattern of its teeth, its long foot, large ears, and pure white belly, separated from the more or less rufous dorsal regions by a clearly marked line of demarcation, are predominant. Thus its local forms, though distinguishable, are not nearly so readily appreciable as, say, those of *Sciurus vulgaris*; and *Mus sylvaticus chevrieri* Milne-Edwards, of Tibet, is at first sight surprisingly like *Mus s. arianus* Blanford, of Persia and Afghanistan, or *Mus s. intermedius* Bellamy, of England, considering the enormous tracts of country by which these forms are separated. Yet there is variation and that distinctly geographical, consisting for the most part (as in the case of the individual variations) in differences of general size, tint, and thickness of the coat of the upperside, intensity of the white colour of the belly, presence or absence of a breast-band, length of tail, and size of ear.

Thus, in Europe, it is easy to divide *Mus sylvaticus* primarily into two very distinct—a larger long-tailed and a smaller short-tailed—subspecies. The larger reaches its maximum both of size and coloration in Eastern Europe (*M. s. princeps*), but towards the West becomes both smaller and duller. Colonies, however, persist right into Great Britain, where they are distinguishable by the presence of a remarkable breast-band of the same colour as the upper surface of the body (*M. s. wintoni*). In Denmark and Scandinavia there is a reduction in size (*M. s. typicus*), but, although the red of the upper surface remains fairly intense, the underside is much dulled; and this process has been carried to its fullest extent in the representatives of the species on the islands of Lewis

and Barra (*M. s. hebridensis*) and St. Kilda (*M. s. hirtensis*), where it is accompanied by a very interesting shortening of the ear and lengthening of the foot proportionately to the length of the body. A representative of the large form occurs also in the Shetlands; but my series is not sufficiently good to enable me to decide finally as to its affinities. The Iberian Peninsula and Morocco seem to be the habitat of a large dull-coloured form, with regard to the exact appearance and relationship of which, in default of more numerous specimens, I am a little uncertain, and for the present can merely allude to it under the name *Mus hayi* Waterhouse.

To turn to the smaller subspecies (*M. s. intermedius*), this is found mainly in the British Islands and in the neighbouring continental areas of Holland, Belgium, and North-west France; but the exact limits of its distribution are as yet uncertain, and it probably intergrades in all directions with other subspecies. It is extremely interesting to find that specimens from such damp western localities as Lewis and Skye in the Scotch Islands, Galway and Kerry in Ireland, and Oporto in Portugal indicate that in such situations the reduction of size and darkening of the colour of the upper surface reaches its maximum. It is not less interesting to find some evidence that there may be two ways of attaining to that greater dullness of coloration which seems to be fitted to a sojourn in the moderately warm, damp regions of Western Europe; and that, whereas in *M. s. hebridensis* and *M. s. hirtensis* this object is attained by rendering more uniform, although not darker, the colour of the upper surface, by the enlargement of the breast-band, the partial obliteration of the line of demarcation between the two surfaces of the body, and the extension of the yellow colour to the belly, the whole consistent with a retention of large size, in *M. s. celticus* the same result is brought about by an increase of the black-tipped hairs on the back, while the belly, although retaining its pure whiteness, is made less conspicuous by reduction of the size of the animal. The occurrence of representatives of each of these forms almost side by side on the small island of Lewis is perplexing; but Mr. de Winton informs me that the larger *M. s. hebridensis* keeps severely to itself on the western side of the island, and that he believes that the presence of the smaller form may here be due to accidental introduction.

As regards the remaining forms, such as *M. s. islandicus*, *arianus*, *pallipes*, *griseus*, *chevrieri*, *draco*, and *M. argenteus*, little is known and little can be said; but there is evidence to show that the representatives of *M. sylvaticus* are characterized in the north (according to Radde) by larger, and in the south by smaller size, and in the latter case by a proportionately smaller hind foot. The thick fur and light upperside of *M. s. pallipes* seem to indicate a development to suit great cold, combined perhaps with desert- or steppe-like conditions; but the curious differences between the manner in which the young grow up in extremes, such as *M. s. draco* and *M. s. intermedius*, are at present inexplicable.

The fact remains, however, that in these subspecies the young are more strikingly differentiated than the adults. In all, the young are duller than their respective adults, but in the East they seem to take a longer time to don the brighter hues of maturity and the manner of effecting the change is more patchy than that in vogue in the West. It may be that in regions where food is abundant and general bodily growth is rapid, the development of the genital organs cannot keep pace with that of the general size, and that with these organs the assumption of the external colours of the adult, which we know to have in many cases a most intimate connection with them, is retarded accordingly.

If it be true that the various stages of progress to maturity repeat in some degree the phylogeny of an animal, then we may, perhaps, assume that the brighter red hues of the adults of several of the subspecies¹ of *Mus sylvaticus* must be regarded as a modern acquirement, the original ancestor of the Long-tailed Field-mice having been a plain coloured, white-bellied House-mouse-like creature. Further, on the same supposition, the adult winter coat being the darker, is nearer to that of the young, and hence to that of the ancestor, whence perhaps it might be inferred that the immediate ancestor was an animal which inhabited a damp, only moderately warm, sunless country, and is most nearly represented in its colour by the subspecies of Western Europe of the present day.

The occurrence of a small dark form in such isolated localities as Lewis, Skye, Galway, and Kerry, and possibly in Portugal, seems to suggest some thoughts on our present views of distribution. We may look on the discontinuous distribution of such a form in two ways. We may regard it as evidence of the survival in isolated localities of an old subspecies, once of far wider distribution; and this is the view that would undoubtedly be adopted had we to deal in this case not with a subspecies, but with a genus or even with a very distinct species. An alternative view may, however, present itself, viz., that we may have here a case of the independent evolution of a similar form under the influence of similar conditions, which in fact one is tempted to regard as a similar reaction of the organism to the impetus of similar stimuli. To the latter view I am, I confess, myself very much inclined, and parallel cases can be found amongst other groups, as, for instance, in the case of the slug recently described by my friend Dr. R. F. Scharff² as *Limax marginatus*, var. nov. *niger*. This, a small dark form, was found by its describer and Mr. G. H. Carpenter "suddenly" appearing at a height of 2800 feet on Carrantuohill, in Co. Kerry, Ireland, and was certainly quite absent from the lower slopes of the mountain. According to Professor Simroth this form occurs also

¹ There are other Eastern *Muridæ* (e. g. *Mus confucianus*) of which the young are dully coloured and the adults red.

² 'Irish Naturalist,' Oct. 1899, p. 214.

in Transylvania, while it only differs from the var. *rupicola* in being unicoloured above. In fact the variety *rupicola* itself would seem to be another case in point, being found, as it is in Lessona and Pollinera, up to a height of 7000 feet in the Piedmontese Alps, as well as in the Mourne Mountains of Ireland, from which it has been recorded by Mr. W. D. Roebuck.

From whatever point of view we regard the numerous forms of *Mus sylvaticus*, it is of extreme interest to find that the changes and variations in different climates are paralleled, to a certain extent at least, not only by other mammals, but by birds and, in some cases, by invertebrates. In a recent paper¹ I showed that the brightening of the colours of certain birds according as they range southwards is paralleled by the Weasel, *Putorius nivulis* Linnæus and its subspecies. So, too, the most richly coloured subspecies of *Mus sylvaticus* which I have seen is *Mus s. draco* from Kuatun, a locality which must be near the extreme south-eastern limit of the range of the species, while in the south-west the deep, almost chocolate upperside of the single British Museum specimen of *M. s. algirus* of Algeria seems to be suggestive of a similar tendency.

It is also of interest to find that the bright, clearly coloured *Mus sylvaticus* of the cold drier regions of Central Europe is the counterpart of the corresponding form of Squirrel, *Sciurus vulgaris rufus* Kerr; whereas the duller subspecies of some of the damper Western regions are paralleled by *S. v. leucourus* Kerr and *S. v. typicus* Linnæus; and other parallels may be sought amongst the Red-backed Voles (*Evotomys*) and their subspecies. We are only just beginning to obtain any general light on the distribution of variation amongst European mammals, but the larger size of *Mus s. princeps* of Central Europe finds a parallel in at least one other species, viz. *Lepus europæus typicus* Pall., of which the Central European and Russian examples are distinctly larger than the Western, *L. e. occidentalis* de Winton². Indeed, it would be easy to quote a good many other instances, taken from birds as well as mammals, which seem to afford evidence of some law of decrease in size from cold and clear to warmer and duller regions. Finally, the occurrence of especially dark and often small forms in various isolated western localities of the British Islands finds an abundant counterpart in other groups. I may point to the Lepidoptera, amongst which so many dark western varieties have been recorded; to the dark Squirrels of damp mountainous continental regions; to our small dark breeds of cattle (Scotch, Irish, and Welsh); and to numerous instances amongst birds, as the Dippers (*Cinclus*) and the Long-tailed Titmice (*Acredula*). Perhaps the most interesting parallel of all is afforded by the Song-Thrush, *Turdus musicus*³, of which it is stated that individuals which inhabit the

¹ Ann. & Mag. Nat. Hist. (7) v. p. 42 (1900).

² See Mr. W. E. de Winton's paper, "On the Hares of Western Europe and North Africa," in Ann. & Mag. Nat. Hist. ser. 7, vol. i. February 1898.

³ Howard Saunders, 'Manual of British Birds,' ed. iv. p. 3.

Outer Hebrides are, like the Lepidoptera of the same islands, small and darkly coloured.

In many cases black forms of some common species of animals occur in the British Islands or in mountains, either in certain defined areas or sporadically, but are not yet in a status to be generally recognized subspecifically. Such are the black variety of the Water-Vole, *Microtus ater* (Macgillivray); the black varieties of the Common Rat, *Mus hibernicus* Thompson; the black variety of the Squirrel, *Sciurus alpinus* Cuvier, of the Pyrenees and Alps; and the dark variety of the Common Snipe, *Gallinago colestis sabinii* (Vigors). Such forms, however, seem to be in many ways analogous, and it is strongly to be suspected that they owe their origin to some common cause, apparently not, in the ordinary sense, a protective one.

I recognize 19 subspecies or phases of *Mus sylvaticus*, which are as follows:—

1. *MUS SYLVATICUS INTERMEDIUS*.

Mus intermedius, C. J. Bellamy, Natural History of South Devon, pp. 195 & 329-330, with woodcut (1839).

Mus campestris, J. J. J. Holandre, Faune de la Moselle, p. 24 (1836), antedated by *M. campestris*, A. G. Desmarest, Mamm. Suppl. p. 543 (1822), which is a *Mus minutus*, Pall. subsp. incert.; see De Selys-Longchamps, 'Études de Micromammalogie: Revue des Musaraignes, des Rats et des Compagnols, suivie d'un Index méthodique des Mammifères d'Europe' (Paris, 1839), and Barrett-Hamilton, Ann. & Mag. Nat. Hist., April 1899, p. 345.

Mus sylvaticus fossilis, P. Gervais, Zool. et Pal. Fr. p. 43 (1859).

Mus sylvaticus auctorum.

Type locality. Devonshire, England.

Nomenclature & Synonymy. The discovery that the original application of the name *sylvaticus* by Linnæus referred to a distinct subspecies, makes it necessary to search for a subspecific name which shall apply to the ordinary lesser subspecies of Britain and the neighbouring continental area. The name *intermedius* of Bellamy, although undoubtedly applied to a large example, seems to be suitable for this use. It is at all events appropriate to an animal which is distinctly intermediate in its characters between several surrounding subspecies.

Description. The colour of the basal two-thirds of all the hairs at all ages and seasons is slate-grey, but this is concealed by the terminal portions, about 2 or 3 mm. in length, which are coloured quite differently and to the tints of which the animal owes its general appearance. In adults the upperside is sandy reddish brown, not usually of rich or intense tints, the lower side pure white, with a very clear line of demarcation between the colours of the two surfaces passing along the flanks, inner surface of the thighs, fore limbs, and cheeks. Many hairs of the upperside are tipped with black, especially in the median dorsal region, and these black tips, becoming greatly increased in winter, constitute

the only seasonal difference which I can discover. The presence of the black-tipped hairs on the dorsal region gives the Mice the appearance of being more darkly coloured on the back and redder on the flanks; but there is a good deal of variation, even amongst individuals from the same locality, in regard to the comparative darkness, greyness, or redness of the upperside. As a general rule, very old specimens seem to be the reddest, but I have seen very large ones which were remarkably grey. In many there is present a breast-spot of variable extent, which may in some cases extend backwards along the median ventral surface, either as a thin rufous line or as a rather broad and diffused yellowish staining of the belly.

In old nursing females the underside often becomes very bare, and may lose its pure white colour.

In immature specimens the coloured tips to the hairs are not well developed; hence young mice are always duller and more House-mouse-like on the upper surface. In some cases, as in that of a specimen from the Island of Skye, the colour, both above and below, is identical with that of typical *Mus musculus*; others are slate-grey, and one from Shetland has the upperside like that of typical *musculus* and the underside white. Some very young specimens lack the line of demarcation between the colours of the upper and under surfaces and are dark-bellied, that is to say, the white-tipped hairs are absent and the dark underfur prominent; but this condition is not invariable, and many are comparatively brown or red, although not so much so as are the adults. My remarks respecting the colour of immature specimens are mainly based on the British series at the Natural History Museum and those in the collections of Mr. W. E. de Winton and myself, consisting chiefly of specimens taken in the months of May and July: later in the autumn a pelage which more nearly resembles that of the adults is assumed. In mild climates young are born until late in the year, since two females trapped by Mr. Oldfield Thomas near Calais, France, in September were nursing; other nursing females have been trapped as late as 10th September by Mr. W. R. Ogilvie Grant in Elginshire, Scotland, and on the 8th October at South Sutor, Cromarty, Scotland, and of the form *M. s. wintoni* on Dec. 7th, by Mons. A. Robert in Haute-Savoie. It would seem, then, that specimens in immature pelage may occasionally be trapped almost throughout the winter.

Moult. The rarity of the specimens showing a moult is worth noticing, and I can only suppose that the change from one coat to the other is made gradually and in an inconspicuous manner. One of Mr. Thomas's August specimens from Holland, a male (no. 98.2.1.18), is moulting from the rufous to a duller coat, and has just a patch of the former colour on the rump, whereas the rest of the body is of a dull colour.

Dimensions. The tables (p. 423) show that this subspecies is intermediate in size between giants of its race like *M. s. princeps* and pigmies like *M. s. celticus* or *M. s. tauricus*.

Skull. The skulls of adult British examples do not usually exceed 26 mm. in total length, the more usual length being 25 mm.

Distribution. Great Britain, Ireland, and the Scotch Islands (except the localities inhabited by other subspecies, such as St. Kilda, part of Lewis (Outer Hebrides), Barra, parts of the West of Ireland, probably Shetland, and the sporadic localities occupied by *M. s. wintoni*); the Channel Islands (Alderney), Holland, Belgium, Brittany, and North-west France, parts of Switzerland, and perhaps portions of South-western France; but the exact limits of the distribution of this form are uncertain, and it is not known whether its range is clearly marked off from, or whether it intergrades with, the larger forms.

General Remarks. Excluding examples of *M. s. wintoni*, I do not find amongst specimens from the mainland of Great Britain any tangible local differences; but to insure satisfactory results in this direction, a very carefully collected set of specimens from several selected localities would be necessary. The skins from Oxfordshire and Leicestershire (both those in Mr. de Winton's and those in the British Museum collection) certainly seem brightest and reddest, but they are summer skins, and there is no conclusive series from other localities of exactly the same date with which to compare them. Further, an old nursing female taken in Glamorganshire in July is as brightly coloured as any of them. Again, specimens from the London Parks are, like the birds and Lepidoptera, very dark and smoky. I am not, however, quite able to trace beyond dispute any local British variations, other than those already mentioned, but the subject is of great interest and well worthy of the attention of British naturalists. Certainly, if there be any reliable conclusions to be drawn from recent work on the colour of mammals, the mice of Central England should be on the whole brighter and redder than those of the surrounding districts; but a study of them should be based not upon individuals, but on averages, and would need very careful procedure. It is at least confirmatory of my supposition that amongst the more remarkable individual skins which I have examined are an old nursing female from Clifton, in which there was a thick median line of yellow on the belly, and a male from Northumberland (December), in which the belly is dirty white and exhibits also a buff median line. I have not been able to separate Scotch from other British specimens.

As regards continental forms, it is probable that the further accumulation of specimens will show the existence of hitherto undetected subspecies. Thus, while those both from Brunswick, Germany, and from Belgium belong to a type which, like *M. s. intermedius* generally, may be distinguished from most Scandinavian specimens by their clearer colour both above (grey) and below (white), I fancy that, of the two, the Belgians are the less clearly white-bellied. Swiss specimens, on the other hand, seem to agree with those from Upsala, Sweden, in having the central dorsal region darker and more accentuated, and the underside duller, while those from Bergen, Norway, are redder.

Monsieur F. Lataste seems to have got upon the track of some such subspecies when he wrote ¹ that in the park of M. Foucassis, Department Gironde, France, he had taken individuals "dont les teintes foncées, même en dessous, se rapprochaient beaucoup de celles de la souris." This variety he contrasts with one from the dependencies of the observatory of Pic du Midi, at an altitude of nearly 3000 metres, "et dont la robe est d'un roux vif éclatant. Plusieurs sujets de cette dernière m'ont été envoyés par M. Vaussenat;" but I suspect that, in the case of the first of these varieties, M. Lataste had to deal with immature mice.

2. *MUS SYLVATICUS CELTICUS*, subsp. nov. (Plate XXV. fig. 2.)

Type. A female, No. 0.3.11.1 (British Museum Collection), from Caragh Lake, Co. Kerry, Ireland: collected by Colonel J. W. Yerbury, on Nov. 27, 1894.

Distinguishing Characteristics. A small-bodied Field-mouse, with a very dark upperside, caused by a great increase in the number of black-tipped hairs. The underside, unlike that of *M. s. hebridensis* and *M. s. hirtensis*, is clear white, although not so clear as in *M. s. wintoni*, and the line of demarcation between the coloration of the two surfaces is sharply defined. The dimensions of ear and hind foot seem to show that these are slightly larger in proportion to the general body-size than is the case with *M. s. intermedius*. This subspecies no doubt intergrades with Irish examples of *M. s. intermedius*. Thus Col. Yerbury's specimens are the most and Mr. Passingham's the least accentuated specimens which I have seen.

Skull as in *M. s. typicus*; total length about 25 mm.

Distribution. West of Britain, I have seen specimens from Caragh Lake, Co. Kerry (Col. J. W. Yerbury), from Fermoy, Castlegregory, in the same county (Mr. G. A. Passingham), as well as from Woodpark, Co. Galway (Mr. R. F. Hibbert). These specimens are matched exactly in colour and size by three from Eisken, in Lewis, Outer Hebrides (Major H. D. Thornycroft), and one from Skye (Mr. J. Steele Elliott). A similar one from Oporto, Portugal, collected by Mr. James Searle, may be an accidental variety or may indicate the occurrence of this small dark form in other parts of Western Europe.

General Remarks. So long ago as 1841 the late Rev. Leonard Jenyns (afterwards Blomefield) received from the County of Kerry, Ireland, some long-tailed Field-mice, one of which was taken at an altitude of 2500 feet. He at once noticed that they differed from the typical *Mus sylvaticus* "in being of a darker colour, smaller, and with some of the relative proportions rather less" ², and suggested the occurrence of an interesting local race in these mountains. Not being, however, in possession of a satisfactory series, he wisely refrained from giving a name to his specimens.

Then followed the age of inexactness, during which Jenyns's mice,

¹ Act. Soc. Linn. de Bordeaux, xxxviii. p. 33 (1884).

² Ann. & Mag. Nat. Hist. vol. vii. p. 268, June 1841.

like so many other local forms, were put aside with the remark that they could be only regarded as "varieties of *Mus sylvaticus*"¹. Irish naturalists, however, well knowing the tendency of the elements of our fauna to become darker in the west of the country, have all along suspected that Jenyns's suggestion was well worthy of attention. Hence they have been gradually accumulating a series of Field-mice from Ireland, with the result that I think I may now say definitely that we have, in the west of Ireland, a small dark subspecies of Field-mouse, which nearly corresponds to Jenyns's description, and which is quite unlike the Field-mice of the greater part of Europe, of England, or, what is equally interesting, of the east and centre of Ireland. For this small subspecies I propose the name *Mus sylvaticus celticus*.

The first specimens of this Mouse received at the Museum were a series of six, collected by Col. J. W. Yerbury, at Caragh Lake, Co. Kerry, between Nov. 27th and Dec. 1st, 1894. These, although some allowance must be made for the winter coat, are darker and smaller than any English specimens which I have seen even of that season. In spite of these characters, I at first hesitated to regard the specimens as conclusive evidence of the truth of Jenyns's hypothesis. It was possible that in such a mild climate the mice might continue breeding to a late date in the year, so that examples showing the characteristics of immaturity might be obtainable even in December, and hence Col. Yerbury's specimens might possibly be regarded as not wholly adult. The colour of the underside, however, did not suggest immaturity, it being as white and as clearly marked off from that of the upperside as in any English examples, nor were the skulls those of immature specimens. Hence I felt sure that I should eventually obtain others like them from the west of Ireland. These were forthcoming in 1896, when Mr. R. F. Hibbert sent me four small dark Mice from Woodpark, Co. Galway. The date at which they had been taken (February and March) was such as to almost preclude the possibility of their being immature, and they were further supplemented by a third set of the small dark western Mouse sent by Mr. G. A. Passingham, from Fermoy, Castlegregory, in the very same county which had produced both Jenyns's and Colonel Yerbury's specimens.

The interest of these specimens was heightened when I found them exactly matched in colour and size by three collected at Eisken, in Lewis, in the Outer Hebrides, in October and November 1895, and by one sent to the British Museum of Natural History by Mr. J. Steele Elliott, from Skye, in the same year. These specimens seem to indicate that this small Western subspecies of *Mus sylvaticus* is not confined to the west of Ireland, but is found in similar localities in the Western Scotch Isles. The late date of capture (June 24th) of the Skye specimens shows that the dark colour is not characteristic of winter, but is retained throughout the year. It is remarkable that I should have seen a perfectly similar

¹ See Bell's 'British Quadrupeds,' ed. ii. p. 296 (1874).

specimen collected at Oporto, Portugal, by Mr. James Searle, on December 12th, 1896; but too much must not be inferred from a single specimen, which may possibly indicate the existence of *Mus s. celticus* in the west of Portugal, or may be only an accidental variety. Blasius, however, knew of the occurrence of dark Field-mice in the higher mountains of Europe¹. This single specimen from Oporto, whatever it may be, is certainly very unlike the ordinary Portuguese Field-mice.

A remarkable fact is the occurrence of this mouse on the same island (Lewis) as the very distinct *M. s. hebridensis*, which is one of the larger forms of Field-mice. I am informed by Mr. de Winton that the latter keeps to its own part of the island, and that probably the two do not intermingle. It is curious that while a big and little form of *Mus sylvaticus* occur here side by side, each finds a different method of fitting itself for the damp dull climate of the west.

It is interesting to find that the Field-mice of the centre and east of Ireland are normal, and, as far as I can make out, show neither any darkening of the colour of the upper surface nor any diminution of size. Among these normal Irish mice must be included specimens from Ballaghmoon, Co. Carlow (Mr. J. G. Symes), from Cashel, Co. Tipperary, and from the neighbourhood of Arthurstown, Co. Wexford, together with those in the Dublin Museum from Cos. Dublin, Wicklow, and Louth.

3. *MUS SYLVATICUS* *HEBRIDENSIS*.

Mus hebridensis, W. E. de Winton, Zoologist, Oct. 1895, p. 369.

Mus sylvaticus hebridensis, W. E. de Winton, Zoologist, Nov. 1895, p. 426.

Type. No. 95.10.25.1 (British Museum Collection), from Barra, Outer Hebrides (W. E. de Winton).

Distinguishing Characteristics. Resembles *Mus sylvaticus intermedius* in general form and colour, but is larger (about equal to *M. s. wintoni*), and has proportionately smaller ears, larger hind feet (especially stout in males), shorter and thicker tail, and generally stouter build. The colour of the upperside is more uniform and less bright than in *M. s. intermedius*; that of the underside is "generally dusky or sandy, with no distinct line between the upper and under parts" (de Winton); that of the tail is almost uniformly "brownish grey."

Skull large: total length of that of the type specimen 27 mm.

Distribution. The islands of Lewis and Barra in the Outer Hebrides.

General Remarks. This island-form was first obtained by Mr. J. Steele Elliott; but to Mr. de Winton is due the credit of having written the first published notice² of so interesting an addition to the British fauna.

¹ Säugethiere Deutsch. p. 324 (1857).

² Ann. Scott. Nat. Hist., Jan. 1895, p. 53.

This gentleman, to whose kindness I am indebted for permission to examine the whole of his interesting series of 14 specimens of this subspecies, has drawn my attention to the curious fact that the young males appear to lose the dull hues of immaturity of the upperside, and to don the reddish colour of maturity, at an earlier age than do the females, so that young males and females of the same age are actually distinguishable by their colour alone. If this be so, it would seem to be a quite unique case in the Rodentia, an order among the species of which, as I am informed by my friend Mr. Oldfield Thomas, sexual differences are excessively rare.

4. *MUS SYLVATICUS HIRTENSIS*.

Mus hirtensis, Barrett-Hamilton, Proc. Zool. Soc. 1899, p. 81.

Type. No. 94.7.16.1 (British Museum collection), a young male collected by Mr. J. Steele Elliott at St. Kilda.

Distinguishing Characteristics. Closely allied to *M. s. hebridensis*, from which, however, it differs in its slightly larger size, and also in the greater amount of buff or yellowish-brown coloration on the underside. Like *Mus s. hebridensis*, it differs from *M. s. intermedius*, apart from its greater size, in the more uniform coloration of the upper surface of the body, in the absence of the clearly defined white underside, and in the longer feet and shorter ears.

The *skull* is similar to that of *M. s. hebridensis*, but appears to be slightly larger, reaching a length of 29 mm., and equalling in size that of the largest specimen of *M. s. wintoni*.

Distribution. Known only from the island of St. Kilda.

General Remarks. This is another interesting insular development of *Mus sylvaticus*, the status of which has been already discussed (*op. cit.*). Like *M. s. hebridensis*, it seems to have been first obtained by Mr. J. Steele Elliott, who presented the type specimen¹ to the British Museum in 1894. This was supplemented by a series procured for me by my friend Mr. Henry Evans, of Jura, Scotland, in 1898. I have already suggested the possibility that this Mouse may be indigenous to St. Kilda, a suggestion which is heightened by the fact that, as Mr. Steele Elliott informs me, "there is no landing-place at St. Kilda, so rats and mice stand a poor chance of getting on the islands from any boats that call, especially as provisions taken on are also very limited"².

5. *MUS SYLVATICUS TYPICUS*, Linnæus, Syst. Nat. ed. 10, 1758, p. 62.

Mus flavicollis, H. B. Melchior, Den danske Stats og Norges

¹ Trapped in a hole in a loose stone wall at a height of about 6 feet from the ground.

² Mr. R. M. Barrington writes me that when he was at St. Kilda in 1881 he found a dead and dried specimen on the headland opposite the Doon, but, unfortunately, did not preserve it.

Pattedyr, p. 99, pl. i. (1834); *nec* A. Dehne, W. E. de Winton et aliorum (vide sub *M. s. wintoni*).

Type locality. Upsala, Sweden.

Nomenclature and Synonymy. Melchior's *M. flavicollis* must stand as a synonym of *M. s. typicus*, since I find that the Mice of Hilleröd, in Zealand (an almost topotypical locality for the former name), belong to the latter form, as shown by a collection made there by Mr. Oldfield Thomas. This is unfortunate, since the name *flavicollis* had, on the initiative of Mr. de Winton, been applied to its British representative, for which, therefore, a new name must now be instituted.

Distinguishing Characteristics. A greyish Mouse, with rather dark central dorsal region, resembling the subspecies *wintoni* in size, but slightly smaller, and with the white of the underside far less pure, the chest-band less prominent, and a slight tendency to display a washing of yellowish colour on the underside.

Distribution. Parts of Denmark, Norway, Sweden (I have seen specimens from Laaland, Denmark; Bergen, Norway, and Upsala, Sweden), and, possibly, the southern shores of the Baltic. Specimens from Brunswick, Germany, are intermediate between this and other subspecies.

General Remarks. Linnæus may possibly not have had an adult before him when he wrote his original description of *Mus sylvaticus*, which runs as follows:—"M. cauda mediocri, palmis tetradactylis, plantis pentadactylis, corpore griseo pilis nigris, abdomine albido." This would apply very well to a not quite mature animal. At all events the Long-tailed Field-mice of the localities given above are distinguishable from those of other parts of Europe. In size they are intermediate, being not so large as *M. s. wintoni*, but larger than *M. s. intermedius* from Ireland, England, and the neighbouring continental areas. The Mice of Brunswick seem to connect this subspecies and the larger *M. s. wintoni* and *M. s. princeps*. A series obtained there by Mr. J. A. Loring are smaller and less bright than other specimens which I have seen, notably a set procured by myself in 1894.

It is through the courtesy of Mr. G. S. Miller, Junior, who sent me over two specimens collected by Mr. J. A. Loring at Upsala, that I am enabled to know definitely what the Mouse which Linnæus described is really like. It seems to be a reduced and dulled edition of *M. s. wintoni*.

I strongly suspect, however, the existence of two subspecies in the Scandinavian Peninsula, but the material at my disposal is not yet sufficient for their proper differentiation. The skins which I have examined suggest the inference that those from Bergen are redder on the flanks, darker on the central dorsal line, and yellower beneath than those from Upsala, which latter agree with skins from Meiningen, Germany, and are not so red on the flanks, nor so dark on the central dorsal line; all the Scandinavian and Meiningen specimens possess a breast-band or spot, and in two or three individuals there is a wash of yellow continued right along the

median ventral line. But these differences, if real, are minute, and I should like to see them substantiated by the accumulation of far ampler material before recognizing them subspecifically.

6. *MUS SYLVATICUS CELLARIUS*.

Mus cellarius, J. F. Fischer, Zool. Gart. vii. p. 153 (1866), and xiii. pp. 223, 224 (1872).

Type locality. Cellars at or near St. Petersburg, Russia.

Nomenclature. The inappropriate name *cellarius* must unfortunately apply to the subspecies of the St. Petersburg district, since there can be no question that Fischer's *Mus cellarius* was simply a cellar-haunting individual of *Mus sylvaticus*, at first described by him as a variety, but later accorded full specific rank.

Distinguishing Characteristics. I am uncertain as to the appearance of this form, having never seen a skin of it. Mr. G. S. Miller, Junior, has, however, been good enough to send me over a single skull (No. 3616 of his own collection), which must be regarded as topotypical of the subspecies. The skull is a large one, differs radically from that of *M. s. typicus*, and has apparently its nearest relative in *M. s. princeps* of Roumania, a supposition which gains support from the fact that Mr. Miller writes of the skin, which he had unfortunately mislaid and therefore was unable to send to me, that it is simply a huge *sylvaticus*. The skull has a greatest length of 27 and a greatest breadth at the zygoma of 14 mm., so that while far larger than that of *M. s. typicus*, it is not so large as that of *M. s. princeps*, the largest skull of which has a total length of nearly 30 mm. It is a shorter-nosed and more compactly framed skull than is that of *M. s. princeps*, to which, however, it must be very closely allied.

Distribution uncertain, at present only known from the type locality. Probably the neighbourhood of St. Petersburg and the adjacent parts of Russia.

7. *MUS SYLVATICUS WINTONI*, subsp. nov.

Mus sylvaticus var. *flavicollis*, A. Dehne, Allgem. deut. naturh. Zeit. p. 182 (1855).

Mus flavicollis, W. E. de Winton, Zoologist, Dec. 1894, pp. 441-445; nec Melchior, Danske Stats og Norges Pattedyr, p. 99, pl. i. (1834).

Type. A male, No. 0.3.12.1 (British Museum Collection), Graftonbury, Herefordshire, 8th June, 1894 (W. E. de Winton).

Synonymy and Nomenclature. For the original description of this fine Mouse we are indebted to Mr. W. E. de Winton, who discovered it at Graftonbury, Herefordshire. In his anxiety to avoid the rash institution of a new name, he was led to identify it with Melchior's *Mus flavicollis*. Since, however, a series of Long-tailed Field-mice procured by Mr. Oldfield Thomas at Hillerød, Zealand, Denmark—a locality almost topotypical of Melchior's

Mouse—prove to be different from the present form and identical with Mice from Scandinavia, it is unfortunately necessary that *Mus flavicollis* Melchior should stand as a synonym of *Mus sylvaticus typicus* Linn. Mr. de Winton's discovery, therefore, needs a new name, and I now take the opportunity of connecting it with its discoverer, to whose excellent field-work amongst British Mammals we owe our knowledge not only of this, but of the Hebridean subspecies. The use of the name *flavicollis* by other writers, such as Dehne, was probably in connection partly with *M. s. typicus* and partly with *M. s. princeps*, so that a certain amount of nomenclatural confusion cannot well be avoided.

Distinguishing Characteristics. Generally speaking, a remarkably finely developed *Mus sylvaticus*, in which the size is above the average, and the colours both of the upper and under sides are very pure and intense. Specimens of all ages usually, but by no means always, possess a well-defined breast-band, "about 8 mm. broad, passing along the chest, immediately in front of the fore legs, with a cross or longitudinal stripe in the centre extending forward about 5 mm., and back along the sternum about 10 mm., where it is entirely lost, unlike the slight dash of colour so frequently found on the chest of *Mus sylvaticus*, and which varies from the smallest spot on the breast to a decided yellow-brown tinge extending over the whole belly" (de Winton, *op. cit.*). The tail is longer than in *M. s. intermedius*; and Mr. de Winton gives the number of vertebræ as 30, as against 27 only in the latter subspecies. From *M. s. princeps* it may, perhaps, best be distinguished by its slightly duller colour and the more frequent occurrence and greater extent of the breast-band. Western specimens show the greatest development of the breast-band, which seems to become less conspicuous towards the east.

Skull larger and stronger than in *M. s. intermedius*, reaching a total length of 27 mm. and upwards.

Distribution. Sporadically distributed in colonies amongst *M. s. intermedius* in England, but replacing it eastwards. From England I have seen specimens from Graftonbury (de Winton) and Bishopstone, Herefordshire; Oundle, Northants (the late Lord Lilford); Sussex, Suffolk, and Northumberland. On the Continent it seems to become more dominant towards the east, until it must somewhere intergrade with its eastern representative, *M. s. princeps*, which appears to be the only form in Roumania, and perhaps also in S. Russia. Towards Denmark and in the neighbourhood of the South Baltic it is replaced by *M. s. typicus*, *M. s. cellarius*, or by intermediate forms, a set of which I have myself trapped at Brunswick. There are in the British Museum specimens from Tharand, Saxony; Magdeburg; Haida, Bohemia; Niesky, Silesia, and from Western Hungary. So long ago as 1855 A. Dehne (*op. cit.*) recognized a big Field-mouse with golden collar and long tail as not rare in the district of Pirna in Saxon Switzerland, while Prof. Nehring¹ states that there are specimens in the

¹ Katalog der Säugethiere, p. 13 (1886).

Berlin Museum from Rügen. Lastly, a set of eight males and three females collected by Mons. A. Robert at Lucinges, Haute-Savoie, in December 1899, at an altitude of 1100 metres, although, perhaps, slightly smaller and darker than the largest *M. s. wintoni*, and with the chest-spot less strongly developed, agree so closely with this form in the length of tail, coloration of the underparts, and general appearance, that I prefer to unite them with it, at least provisionally. This form doubtless occurs also in numerous other localities.

General Remarks. It cannot be denied that the treatment of *M. s. wintoni* at first presented a good many difficulties, at least as long as we knew it only from isolated localities. It seemed impossible that a large and small form of *Mus sylvaticus* could occur intermingled throughout the same area without interbreeding. Despite the assertion of Mr. de Winton, who has had such exceptional opportunities of studying these mice in Herefordshire, that the two forms keep quite separate, breed true, and show no intermediates, I was for a long time inclined to treat them as two parallel forms of one dimorphic animal. Even after colonies had been found on the Continent the difficulty remained, and was not dispelled until I had had the opportunity of working out a collection of small mammals taken by the late Mr. W. Dodson in Roumania, and which contained a fine series of the local form of *Mus sylvaticus* of all ages. These all proved to be very different from *M. s. typicus*, and are a bright Eastern representative of *M. wintoni*, which I have now no hesitation in regarding as the Western sporadic representative of the large East European Field-mouse (*M. s. princeps*).

8. *MUS SYLVATICUS PRINCEPS*, subsp. nov. (Plate XXV. fig. 1.)

Mus sylvaticus var. *flavicollis*, auctorum.

Type. Original no. 25, a female, Bustenari, Roumania, 13th April, 1899, collector the late W. Dodson : caught at foot of dead stump in oak-forest.

Distinguishing Characteristics. An extremely large Mouse apparently identical in size and proportions with *M. s. wintoni*, but adults are even brighter red in colour above and purer white on the underside. Many examples possess a breast-spot or band, but this character is not universal, and the band is not so extensive as in *M. s. wintoni*. Immature specimens are very blue, and resemble the young of *M. s. draco*; they frequently retain the dark colour of the upperside until they are fully as large as adults of *M. s. typicus*.

Skull. A large massive edition of that of *M. s. typicus*, reaching a total length of from 27 to nearly 30 mm.

Distribution. This was the only Long-tailed Field-mouse obtained by W. Dodson in Roumania, whether in the beech and oak forests of Bustenari, in the Carpathians N.W. of Bucarest, at a height of 480 metres; at Comana, south of Bucarest; under brushwood on a high plateau near Breba, a large and highly cultivated valley amongst

the Carpathians; or in the comparatively flat cultivated country at Gageni, at the foot of the Carpathians, north-west of Bucarest. Radde's description of the form found in the Caucasus, the Crimea, and in Western Siberia shows that a band of large *sylvaticus*-like Mice extends eastwards right into Siberia until in the East they meet the subspecies *M. s. chevrieri*; but, in the absence of specimens, it is impossible to lay down the exact relationships of these forms, or to state where one ends or the other begins. A single young specimen from Montenegro seems to belong to *M. s. princeps*, and, as has been stated above, a set from Haute-Savoie are in certain respects intermediate between this form and *M. s. wintoni*, with which form it must intergrade in various localities.

General Remarks. *M. s. princeps* is undoubtedly a bright East European representative of *M. s. wintoni*. For our knowledge of it we are indebted to the late Mr. W. Dodson, whom, through the liberality of the late Lord Lilford, I was enabled to send on a collecting trip to Roumania in the spring of 1899. Mr. Dodson brought back a fine series of 44 examples of all ages and sexes, showing that this form occurs in the regions which he visited to the apparent entire exclusion of the smaller forms of Long-tailed Field-mice.

This Mouse seems to breed in early spring, for amongst Mr. Dodson's specimens is a young one caught on April 15th, 1899, which, although attaining to a head and body length of 87 mm., was still in the slaty-coloured pelage of immaturity.

9. MUS SYLVATICUS ISLANDICUS.

Mus islandicus, F. A. L. Thienemann, Nat. Bemerk. ges. auf einer Reise im Norden von Europa, p. 153 (1824).

Type from Iceland? non existent; a co-type in Brit. Mus. of Nat. Hist., no. 45.11.15.17, received from Dr. Thienemann.

Description. "*M. cauda corpore æquanti supra e fusco cinereus subtus albus.*" Seems to be smaller than ordinary *M. sylvaticus*.

Distribution. Iceland.

General Remarks. It has long been known that small rodents of some sort are found in Iceland, and there have been many discussions as to the exact nature of them. Some naturalists have supposed that they are Lemmings¹; but it is now certain that some forms both of *Mus sylvaticus* and of *Mus musculus* occur in the island. The Rev. H. H. Slater has been good enough to inform me that, while both species occur on the coast, the former is the House-mouse and the only species of the interior. Thienemann's description, although it gives no characters whereby *M. s. islandicus* may be distinguished from the Mice of other localities, and although he was himself of the opinion that his Mouse presented some of the characters both of *Mus sylvaticus* and of *Mus musculus*, clearly

¹ See the remarks of J. Steenstrup in 'Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjöbenhavn,' pp. 51-66 (1867), translated in the Ann. & Mag. Nat. Hist. ser. 4, iii. pp. 445 &c. (1869).

applies to some form of *Mus sylvaticus*¹. His description is certainly borne out by one of his specimens now in the British Museum of Natural History (no. 45.11.15.17), which, although an old and faded skin, and of little use for a careful and accurate examination of its characters, undoubtedly belonged to a *Mus sylvaticus*-like Mouse. I cannot distinguish the skull by any cranial or dental characters. The ears and feet of this specimen would appear to be rather shorter than in ordinary examples, as is also the case with the dimensions of two specimens in alcohol from the Gerbe collection as given by Mons. F. Lataste. Lastly, Herr Herluf Winge, to whom I wrote for information regarding the specimens in the Danish Museum at Copenhagen, has been good enough to inform² me that the Museum possesses four Icelandic specimens of *Mus sylvaticus*, "two skins and two spirit-specimens, all of them looking very ordinary, quite resembling Danish specimens." The measurements sent me by Herr Winge are not smaller than those of average *sylvaticus*.

There can be little doubt that the Field-mouse of Iceland is very close to that of Europe, and can only be regarded as subspecifically distinct.

10. *MUS SYLVATICUS* HAYI.

Mus hayi, G. R. Waterhouse, Proc. Zool. Soc. 1837, p. 76.

Type from Tangier, Morocco, no. 52.9.13.9 (British Museum Collection), in alcohol, from the collection of the Zoological Society of London.

Nomenclature. *Mus hayi* Waterhouse is simply *Mus sylvaticus* of Morocco.

Distinguishing Characteristics. This subspecies can only be described at present from its negative characters. It is not a large bright Mouse like *M. princeps*, but its size exceeds that of *M. s. intermedius* of England, and it has in addition the tail usually longer than the head and body.

The *skull* commonly reaches a length of 26 mm.

Distribution. For the present I am obliged to include under this name the Long-tailed Field-mice of Morocco, Spain, Portugal, and the neighbouring countries, including those of the Mediterranean islands. Of these I have seen specimens from Corsica and Sicily, the latter of which, however, have a name ready for them in *Mus dichrurus* Rafinesque.

Later investigations will probably show the existence of more than one subspecies in these regions. Thus some specimens from Villabra, Galicia, Spain, are small and very red; they come from a height of 1300 metres, and probably indicate the existence of more than one subspecies in Spain.

¹ Although Rüppell, who seems to have examined the original specimen of Thienemann, has declared it to be a *Mus musculus*, a piece of information for which I am indebted to Herr H. Winge.

² *In litt.* of 14th April, 1899.

[*Musculus dichrurus*, C. S. Rafinesque, Précis des Découvertes et Travaux somiologiques, p. 13 (1814).

Myomys sicula, Lesson, Man. de Mamm. p. 27 (1827).

Mus sylvaticus, J. H. Blasius, Säugethiere Deutschlands, p. 322 (1857); Barrett-Hamilton, Ann. & Mag. Nat. Hist. ser. 7, vol. ii. p. 426 (Nov. 1898).

Type locality. Sicily.

Synonymy and Nomenclature. The substitution of the generic name *Musculus* for that of *Mus* is explained by Rafinesque under heading of his *Musculus frugivorus* (= *alexandrinus*, Is. Geoffr.) in the same work. He simply writes "J'ai changé le nom trop court et équivoque de *Mus* en *Musculus*."

Description and General Remarks. In the absence of a series of the Long-tailed Field-mouse of Sicily I am as yet unable to decide whether it be distinct or not. Mr. J. I. S. Whitaker has sent over one or two specimens for identification, which, however, do not form material sufficient to enable me to make a thorough comparison. They seem to vary a good deal amongst themselves, one being very red in the colour of the upperside and another very much duller. The size seems to be larger than that of *M. s. intermedius*.]

11. MUS SYLVATICUS ALGIRUS.

Mus algerius, Pomel, Compt. Rend. Ac. Sc. Paris, xlii. p. 654 (1856); nec Loche, Rev. et Mag. de Zool. p. 49, pl. i. (1858), and Expl. de l'Algérie, sp. 78 (1867).

Type locality. Algeria.

Synonymy and Nomenclature. There can be no doubt that Pomel's name refers to the Long-tailed Field-mouse of Algeria, and, as this name exists, I propose to treat the form as subspecific, although, as in other cases, I have no series of specimens.

Distinguishing Characteristics. There is only one specimen of *Mus s. algerius* in the British Museum of Natural History, but that one, no. 52.5.27.62, although a very old French skin, is so peculiar in appearance that I think it very probably represents a distinguishable subspecies. The skin is a small one, but the coloration suggests that it is that of an adult, the underside being very white and the upperside almost chocolate in tint.

The original description ran as follows:—"Pelage d'un gris-brunâtre, teint de jaune ou de roussâtre, mêlé de quelques longs cils noirs; parties inférieurs du corps, face interne des membres et pieds blanchâtres; parfois une tache rousse à la poitrine; talon brun; oreilles presque rondes, courtes, avec une petite touffe devant le méat; une tache blanchâtre derrière l'oreille; queue grise dessous, brunissant de plus en plus vers le bout. Le corps mesure 0m.,075; la queue 0m.,060.

"Habitat des terriers dans les cultures et les broussailles; quelquefois entre dans les maisons des campagnes."

Distribution. According to Lataste, the Long-tailed Field-mouse has been recorded for Barbary by Poiret, who states that he found

it in great quantities in the cultivated fields¹. Rozet has indicated its occurrence in the neighbourhood of Oran². Loche found it about Algiers; and, finally, Lataste³ himself took it in the plain of Mitidja, at Arba, near Algiers, and in the fields of Azesga, to the north-east of Fort National, "en Kabylie." Lataste did not find it so commonly as Rozet would have led him to expect, and he supposes that that author had confounded several other species with the present one.

This species is not included in Lataste's work on the Mammals of Tunis⁴, so that I presume that it does not occur in that country.

General Remarks. Lataste⁵ states that sometimes the back shows "d'un brun plus terne, et le gris domine sur les faces inférieures," which variation appears to be produced especially in the "pays méridionaux," and he has noted this variety also from Cardillac, Gironde, France, from Ciudad Real, Spain, and from Algeria. Side by side with this he states that he has met some individuals, generally young, which in coloration only were indistinguishable from common Mice. He adds (footnote) that these colours get clearer in alcohol, and after a time such specimens in alcohol are indistinguishable from the normal specimens.

12. *MUS SYLVATICUS TAURICUS*, subsp. nov.

Mus sylvaticus, C. G. Danford and E. R. Alston, P. Z. S. 1880, p. 62.

Type. No. 77.8.13.9 (in alcohol) (British Museum Collection), from the Zebil Bulgar Dag, Asia Minor, collected by Mr. C. G. Danford, on the 5th January, 1876.

Distinguishing Characteristics. This single specimen from Asia Minor cannot be identified with any known form of Long-tailed Field-mouse. It cannot be placed either with the large Mice of Eastern Europe, or with the not very much smaller *M. s. arianus* of Asia. The skull, although the teeth are worn, has a total length of only 23 mm., and is thus smaller even than the smallest Western European subspecies.

Distribution. Uncertain: only known from the type specimen.

General Remarks. Perhaps the nearest ally of this little Mouse is *M. s. algerius*, another little known subspecies. It may be a parallel form to the small Weasel of the Caucasus and Asia Minor, to which I have recently given the subspecific name of *M. nivalis caucasicus*.

13. *MUS SYLVATICUS MAJOR*.

Mus sylvaticus var. *major*, G. Radde, Reis. Sib. i. p. 180, pl. v. figs. 3 & 4 a (1862).

¹ Voyage en Barbarie (1789).

² Voyage dans la Régence d'Alger (1833).

³ "Faune des Vertébrés de Barbarie," Actes Soc. Linn. Bordeaux, vol. xxxix. p. 135 (1885).

⁴ Catalogue critique des Mammifères apélagiques sauvages de la Tunisie (Paris, 1887).

⁵ "Note sur les Souris d'Algérie," Act. Soc. Linn. Bord. vol. xxxvii. pp. 17-18 (1883).

Antedates *Mus wagneri* var. *major*, N. Severtzoff, 1876 (see under *M. s. arianus*), and *Mus decumanus* var. *major*, B. Hoffmann, Abh. Zool. Mus. Dresden, 1887, p. 18.

Mus chevrieri, E. Büchner, Wiss. Res. der von N. M. Przewalski nach Central-Asien unternommenen Reisen &c., Säugethiere, p. 92 (1889).

Type: unknown (? in the Caucasian Museum at Tiflis).

Distinguishing Characteristics. I have no specimens of this Mouse at my disposal. Radde describes it as a large *sylvaticus*, resembling, but distinguishable from, the larger Eastern European Mice.

Distribution. Of the distribution of this, the Western Siberian representative of *M. s. princeps*, we have no exact knowledge, but we know that Herr Radde found *Mus sylvaticus*, of one form or another, wherever he journeyed in Western Siberia. With this form I must place, at least provisionally, Przewalski's specimens as described by Herr Büchner. Przewalski found *Mus sylvaticus* in the mountains of Ganssu, Ala-schan, to a height of 8000 metres, and it is recorded for the Muni-ula, where it lives in holes in meadow-lands.

14. MUS SYLVATICUS ARIANUS.

Mus sylvaticus, F. de Filippi, Viagg. Persia, p. 344 (1865); K. Satunin, Mammals of Caucasus, p. 305, &c.

Mus erythronotus, W. T. Blanford, Ann. & Mag. Nat. Hist. xvi. p. 311 (1875); Eastern Persia, Zool. & Geol. vol. ii. pp. 54-55, pl. v. fig. 3 (1876); Mammals of Yarkand Expedition, p. 54 (1879) (nec *Mus erythronotus*, C. J. Temminck, Fauna Japonica, Mamm. p. 50, 1850).

Mus arianus, W. T. Blanford, Ann. & Mag. Nat. Hist. vii. p. 162 (1881).

"*Mus wagneri*, var. *major* (*M. tokmak* n. sp.?)," Severtzoff, Proc. Mosc. Soc. Nat. vol. viii. p. 2 (1873), translated by J. Carl Craemers in Ann. & Mag. Nat. Hist. xviii. 1876 (see p. 53); Blanford, Mammals of Yarkand Mission, loc. cit.; E. Büchner, op. cit. p. 90; W. L. Slater, P. Z. S. 1890, p. 528.

Typical series. Four specimens from Kohrúd, between Isfahan and Teheran, in Northern Persia, altitude 7000 feet (Indian Museum at Calcutta), and one, no. 74.11.21.22, anno 1872 (British Museum Collection).

Nomenclature and Synonymy. The name *erythronotus* Blanford, being preoccupied by *erythronotus* Temminck, the former naturalist renamed his species *arianus*, under which name I have to designate, for the present at least, the Mice from very widely separated localities and which probably include several distinct subspecies. Severtzoff's subspecific name is preoccupied by Radde's *Mus sylvaticus* var. *major*. *Mus wagneri* itself is a *Mus musculus*-like Mouse. Severtzoff's original description is, as Blanford has pointed out (Mamm. Yark. Mission, p. 54), insufficient to enable his species to be recognized, and it is far from clear whether "*M. tokmak*" is proposed as a name, Tokmak being "the name of a town between Vernoe and Auliáta, lying north-west of Lake Issik and nearly due

north of Káshgar." Further, the types seem to have been lost, being neither in the Museums of St. Petersburg or of Moscow. The usual course would, therefore, have been to have consigned Severtzoff's name to the list of those of unrecognizable species: and this I should have done, had not Herr Büchner, who had under his examination a large number of typical *Mus wagneri* from Turkestan, and who noticed that Severtzoff mentions no *sylvaticus*-like Mouse in his account of the Mammals of that region, bracketed *Mus wagneri major* with *Mus arianus*. I am, therefore, glad to follow Herr Büchner on that point. When, however, we do receive a series of the representative of *Mus sylvaticus* from Turkestan, I should not be surprised if it prove to be neither the subspecies *arianus* nor any other known subspecies.

Distinguishing Characteristics. Although there is no doubt that it is extremely close to *Mus s. intermedius*, like some other geographical forms of *Mus sylvaticus*, *M. s. arianus* was originally described as if it were something so distinct in itself as to need no comparison with any other species; hence no particular characters are laid down in the original description whereby the two may be separated. It agrees with *Mus s. intermedius* of England in general appearance and in the number of the mammæ, and Mr. Blanford's plate in 'Eastern Persia' would do very well for a specimen from Western Europe; but it appears to differ in the lesser size and length of the hind feet, and is said to be never of so intense a red-brown colour on the upper surface. Probably, had we a series from the distant regions where it is found, we should find other points of difference. The colour of the underside of the specimens examined by Herr Büchner was not, as in Mr. Blanford's examples, white, but golden grey (gelblichgrau), with a sprinkling of grey hairs, and there was no breast-spot; but, as has been said above, it is more than likely that several distinct subspecies have been confounded under the name of *arianus*.

I have no series of this Mouse before me, the only specimens at my disposal being no. 74.11.21.22 (1730 a), the skull of a female and one of Mr. Blanford's co-types; no. 96.11.2.1, a female in alcohol from Gulmerg, Cashmere, 5000 ft. (Dr. E. T. Aitchison); and a third specimen in alcohol, no. 91.93.20.15, with the mammæ as in *Mus sylvaticus*; so that I am quite unable to give a decided opinion as to the exact appearance of this form, but must follow Mr. Blanford and other naturalists in considering it distinct. Neither can I lay down any characters which will help to distinguish the skull from that of *M. s. typicus*. The skull certainly appears to be more massive and stronger than the skulls of Western European examples; but it is probable that the cranial characters given by Mr. Blanford¹ would not stand the test of

¹ It may perhaps be well to summarize these, as given by Mr. Blanford in the J. A. S. B. xlviii. pt. ii. (1879):—The occipital portion of the skull and the foramen magnum of European specimens is higher in proportion to its breadth than in *M. s. arianus*; the opening of the posterior nares is narrower, the breadth being less than that of the anterior upper molar, whereas in a skull

comparison with a series of specimens from Western Europe. It is very unfortunate that, whereas Mr. Blanford's original description was taken from the Kohrūd specimens, he afterwards obtained his cranial characters from a specimen from Wakhán, which may have belonged to quite a different subspecies. At all events the cranial characters as laid down by him, and in particular that of the size of the last upper molar, will not apply to his original specimens (skull no. 74.11.21.22, ♂, Persia).

Distribution. So far as our present information goes, and the name being used in the wider sense indicated above, it would appear that *Mus s. arianus* has a wide distribution. Mr. Blanford remarks¹ that "a species apparently identical with the Persian Mouse was collected by the late Dr. Stoliczka² in Wakhán, a province on the Upper Oxus belonging to Afghanistan, and at Kashgar, in Eastern Turkestan; and the same form has since been found by Major Biddulph and Dr. Scully at Gilgit, in the Upper Indus Valley." Blyth³ recorded it from Cherra Punji, India; while Herr Büchner⁴ identified with this Mouse the specimens brought by Przewalski from the rivers Zauuma, Ssairam-mor, and Chapzagaigol, in Central Tian-schan, and from the southern slopes of the mountains of the latter name, to a height of 7500 feet.

It is found as a "steppe-inhabitant in the Ural, as well as on the Kirgies Steppes; but in Turkestan, where *M. musculus* is absent, *M. wagneri* is the house-mouse. It is numerous in the Chimkent and Tashkent houses, where it does not differ at all from the Kirgies-Steppe specimens."⁵

De Filippi⁶ identified the Persian House-mouse as *Mus sylvaticus*, and states that the same species was brought from Shiraz by Marquis Doria. Mr. Blanford, however, declares that a specimen which he obtained from Shiraz is certainly *M. bactrianus*. Mr. Blanford had seen no specimens from Northern Persia, and thought that "although the house-mouse there may be *M. sylvaticus*, it is quite as probable that it is *M. bactrianus*."

"Even if, however, *M. bactrianus* prove to be found in houses throughout Persia, *M. sylvaticus* must also be included in the fauna, as it was found by Ménétries common on the parts of the Tálísh Mountains not covered by trees, and it is said by Eichwald to be abundant in Georgia." "Eichwald includes *M. musculus* L.,

from Wakhán the breadth exceeds that of the molar; the third upper molar of *M. sylvaticus* is about one-fourth the size of the second, whereas in the Wakhán and Gilgit skulls the proportion is one half. It should be noted that Mr. Blanford had only one skull of European *M. sylvaticus* at his disposal, and only the figures of the types from which he had described *M. erythronotus*, the specimens themselves having been mislaid. See also pages 54 & 55 of Mr. Blanford's 'Mammals of the Yarkand Expedition' (1879).

¹ J. A. S. B. vol. xlviii. pt. ii. (1879).

² "At Panja in Wakhán"—Blanford, J. A. S. B. xlv. p. 108 (1875).

³ J. A. S. B. xxiv. p. 721, & xxxii. p. 348.

⁴ *Op. cit.* pp. 90-91.

⁵ Blanford, Mamm. Yarkand, p. 54.

⁶ *Op. cit.* p. 344.

and Ménétries *M. minutus* Pall. (*M. messorius*, Kerr), in the fauna of the Transcaucasian provinces. The latter probably may extend into Persia, but de Filippi particularly noticed the absence of *M. musculus* in the north-western part of the country, where he says it is replaced by *M. sylvaticus*.¹

Of the Caucasus, Rosikoff states² that *M. sylvaticus* is very common in the whole of the region; but in a second publication³ he alludes only to *M. arianus*, so that, as Satunin remarks, it is difficult to ascertain which species really occurs in Malkathales. Satunin himself supports Rosikoff's second opinion.

As regards the Transcaucasian Field-mouse, Satunin himself states that it is difficult to properly name the specimens, since they present characters of both species, but he thinks that on the whole they agree better with *M. sylvaticus*. He finds typical *sylvaticus* at Tiflis.

General Remarks. There can be little doubt that there has been a considerable confusion, perhaps of two or three separate forms, amongst the naturalists who have written of *M. s. arianus*; but for the present, and in the absence of an adequate series of specimens, I must follow Mr. Oldfield Thomas, and regard all the small-footed Central Asian individuals of *M. sylvaticus* as belonging to this form.

Even Mr. Blanford's belief in his own species seems to have become a little shaky, since he wrote⁴ in 1879 that "it is by no means certain that this form may not pass into the Eastern races of *M. sylvaticus*; and it requires comparison with *M. sylvaticus*, var. *major* of Radde; but . . . it appears to be a well-marked type, with a wide distribution in Central Asia."

The best remarks on this form are, I think, by Mr. Oldfield Thomas⁵, who notes the close, almost identical, proportions of *M. arianus* and *M. sylvaticus*, the shorter foot of *M. arianus* (as compared with English examples), the failure of Mr. Blanford's skull-characters for *M. arianus*, and finally adds that, "on the whole, I think that *M. arianus* will be found to represent a short-footed Eastern variety of *M. sylvaticus* worthy of a varietal name, but not enough to merit specific separation."

"De Filippi's '*Mus sylvaticus* L.' is no doubt this short-footed form, and not the true European *M. sylvaticus*."

15. *MUS SYLVATICUS* GRISEUS.

Mus arianus griseus, F. W. True, Proc. U.S. Nat. Mus. vol. xvii. p. 8 (1894).

Typical series (in U.S. Nat. Museum):—

20151 Male. Mountains of Central Kashmir, Sept. 13 1891.
35514 10,000 feet.

20139 Female. Central Kashmir, Oct. 8, 1891. 8500 feet.
35502

¹ East. Pers. pp. 57 & 58.

² 'Die Säugethiere des Malkathales,' p. 58.

³ 'In den Bergen des N.W. Kaukasus,' pp. 20, 31 & 51.

⁴ J. A. S. B. vol. xlviii. pt. ii. p. 97.

⁵ P. Z. S. 1881, pp. 548-550.

20144

35507

Male. Pir Panjal Pass, Aug. 31, 1891. 8500 feet.

Described from three specimens collected by Dr. W. L. Abbott "in pine forests at high elevations, two of them in Central Kashmir and the third in the Pir Panjal Pass."

Description. "Similar to typical *Mus arianus* Blanford in size and proportions, but having the upper surfaces ochraceous grey instead of rufous." An immature specimen "was especially grey above, and coincides in colour almost exactly with ordinary specimens of *M. musculus*." The two other specimens, a male and female, were "greyish, ochraceous brown above, which colour is produced by the mingling of hairs having ocher-coloured tips with others which are black." The dimensions of the feet, given in inches only, were in two of the dried specimens, after soaking in water, "slightly less than an average of measurements of *M. sylvaticus* given by Mr. Thomas."

Distribution. Known only from the type specimens.

General Remarks. Mr. True rightly draws attention to the extreme difficulty of ascertaining the real colour and appearance of *M. s. arianus* from descriptions only. That being so, it is doubly hard to determine in a similar manner the exact value of *M. griseus*; but, until specimens are available, we cannot do wrong, I think, in considering it a mountain form of *M. sylvaticus*. I cannot help suspecting, however, that Mr. True's description of his specimens reads uncommonly like that of an immature set of individuals.¹

16. *MUS SYLVATICUS PALLIPES*, subsp. nov.

Type. No. 75.8.17.6 (British Museum Collection), from Surhad Wakhán, Turkestan, April 28, 1874: collector, Capt. (now Colonel) Biddulph.

Distinguishing Characteristics. The size of the body is apparently similar to, or rather smaller than, that of *M. s. intermedius*, the length of the head and body, feet, and ears in the dried skin being about 85, 19 to 20, and 12 mm. respectively. The tail of the type specimen has been damaged, but is seemingly thicker than that of *M. s. intermedius*. The fur is very thick; the colour of the upper-side extremely light and that of the underside white, but with an ill-defined line of demarcation between the colours of the two surfaces.

Skull. Damaged, but closely resembles that of *M. s. intermedius* except in the size of the last upper molar, which is larger than usual.

Distribution. Known only from the type specimen.

General Remarks. The single skin on which I base this description, although not a good one and having attached to it no dimensions taken in the flesh, is so unlike that of any other specimens of *M. sylvaticus* which I have seen, that I have no doubt that it represents a distinct subspecies. The thick, almost rabbit-like

¹ Since this paper was read I have, through the courtesy of Mr. G. S. Miller, Junior, been able to examine Mr. True's specimens. They are certainly not highly remarkable and would almost pass muster as British, were it not for the slight peculiarity of tint which they show.

fur and the extremely light tints seem to mark this Mouse as a light northeru or mountain form of *Mus sylvaticus*.

17. *MUS SYLVATICUS CHEVRIERI*.

Mus chevrieri, A. Milne-Edwards, Rech. Mamm. pp. 288-9, pl. xl. fig. 2 (1868); E. Büchner, op. cit. supra, sub *Mus sylvaticus major* (p. 413).

Type from Moupin, Tibet (Paris Museum); collector Père David.

Distinguishing Characteristics, &c. This little-known Mouse was originally described as a species on the ground of its slightly greater size than that of *M. sylvaticus*, and agreement in colour with *M. confucianus* A. M.-Edw., as the young of which latter species Milne-Edwards was disposed to regard it until an examination of the skull convinced him of its distinctness.

The general colour is "d'un brun-fauve tiqueté de brun-foncé; les parties inférieurs sont d'un gris très-clair, presque blanches."

Mr. Oldfield Thomas has examined the types, which he thought come very near to *M. arianus* Blanford; their colour above is bright rufous, with the belly white or slate-colour; the fur on the back in some instances is almost spinous. Herr Büchner, who states that he also has seen the types, considers this subspecies identical with Herr Radde's *M. s. major* of Western Siberia, which is itself very close to and a constant Eastern representative of *M. sylvaticus*, while *M. arianus* Blanford represents the same species in the South. According to Herr Büchner's description of the typical series, the ground-colour of the upperside is a rusty golden brown, tolerably strongly mixed with dusky brown or black. The whole underside is white. There is a somewhat strong line of demarcation between the colours of the two surfaces of the body.

Distribution. Not exactly known. I identify with this subspecies only the typical series from Moupin, Tibet, and (provisionally) a specimen (no. 82.6.16.7 of the British Museum Collection) collected by Père David at South Shensi, an inland province of China, in 1873. This locality, which lies considerably to the south-west of Peking, is so far to the north of Moupin that Père David's specimen may represent a new form; but it comes sufficiently near the original description of *M. chevrieri* to be at least provisionally assigned to it. The specimen, which is adult, is apparently of about the same size as my *M. s. draco*, but is brighter in its coloration. As in the Kuatun Field-mouse, the underside is white, but the skull is more massively formed.

18. *MUS SYLVATICUS DRACO*, subsp. nov.

Mus chevrieri, Oldfield Thomas, P. Z. S. Nov. 15, 1898, p. 773.

Type from Kuatun, N.W. Fokien, N.W. China (no. 98.11.1.20 of British Museum Collection); collector, Mr. J. D. La Touche.

Distinguishing Characteristics. In external appearance this Mouse resembles *M. s. typicus* Linnæus, but is slightly smaller and more brightly coloured on the upperside.

The *skull* is narrower and slightly smaller than that of adult of the subspecies *intermedius*, reaching a length of only about 25 mm., and having the anterior portions of the frontals more attenuated, and the nasal region proportionately more slender than in the latter subspecies.

Distribution. At present known only from the typical series.

General Remarks. The Mice identified by Mr. Oldfield Thomas as *M. chevrieri* form quite a nice series of eleven specimens, with which may be considered eight specimens collected by Mr. C. B. Rickett in the same locality. Although obviously representing a subspecies of *M. sylvaticus*, I am unable to identify them with any known phase of that species. They cannot be *M. chevrieri*, for they are not larger, but rather smaller than the average; and the colour of the upperside, although brighter than that of *M. sylvaticus* from Western Europe, is not like that of *M. confucianus*. They cannot well be *M. s. arianus*, Blanford, the description of which certainly does not apply to them, while they differ in more than one obvious respect from *M. s. intermedius*.

The series represents individuals of very varied age, from quite young specimens to adults. The young seem to undergo very different changes of colour in their progress to maturity from those undergone by *M. s. intermedius*. When very young, they are of a darker slate-colour; and they appear to retain the dull slaty hues of immaturity until they reach a considerable, perhaps their full, size. Thus no. 97.6.6.11, a nursing female, with mammae 4+4, is in colour of the upperside very like an ordinary *M. musculus*, but, unlike this species, has a sharply defined white belly. Another nursing female, no. 98.11.1.22, is in process of losing her immature coat, and presents a three-coloured appearance, having the belly white, the central dorsal region clothed in the dusky immature tints, while the flanks show the red colours of an adult. Another specimen has progressed farther, and shows traces of the dark colour only on the rump. This patchy method of assumption of the adult coat seems to be quite unknown in *M. s. intermedius*, in which the process seems to be much more gradual; it would appear to be highly characteristic of this new subspecies. The white belly is present in specimens of all ages, and two or three show a breast-spot or band of more or less complete development.

The skulls of this subspecies are interesting, and are remarkable as compared with skulls of *M. s. intermedius* and even with the skull of the South Shensi specimen, as being very much narrower and more attenuated in the anterior frontal and nasal region. They are far less massive than in examples from Roumania, but almost equal in size those of medium-sized individuals from Western Europe. None of those which I have at my disposal are quite perfect, but the respective dimensions of total length and breadth would appear to be about 25 and 11 mm. The tubercles of the molar 1 are rather regularly arranged, and I think that the central tubercle of the last row (C'' of Hensel) is more prominent than in *M. s. intermedius*.

19. *MUS SYLVATICUS LEWISI.*

Mus abbotti, E. T. Newton, Quart. Journ. Geol. Soc. vol. vii. pt. 2, no. 198 (May 1, 1894).

Nec *Mus abbottii*, G. R. Waterhouse, P. Z. S. July 25, 1837, p. 77, which is a form of *M. musculus* Linnæus.

Mus lewisi, E. T. Newton, P. Z. S. 1899, p. 381.

Type. A skull, being one of those collected by Mr. Lewis Abbott in the ossiferous fissure at Ightham, Kent, and now in the Geological Museum, Jermyn Street, London, S.W.

Description (skull only). Similar to *M. sylvaticus*, but differs from it in the absence of the anterior pointed tubercle of the first lower molar.

Distribution. Known only from the typical series.

General Remarks. The absence of a small dental tubercle seems to be a very small point on which to base a species, especially as the skulls of *M. lewisi* were accompanied by others which were indistinguishable from those of *M. sylvaticus*. But the validity of the specific character must depend on its constancy or inconstancy in skulls of modern *sylvaticus*. I have examined 49 of these with a view to deciding this point, with the result that in 47 the tubercle in question is conspicuously present, while in two only (viz., no. 98.2.2.22, from Cintra, Portugal, and no. 95.10.25.1, from Lewis, Scotland, the type of *Mus s. hebridensis*) had the wearing down of the teeth made it indistinct. The specimens were of all ages, with the teeth both worn and unworn, and from widely different localities, yet in all the tubercle shows clearly, and must therefore, I think, be considered characteristic of present day *sylvaticus*.

We cannot tell what external features were present in *M. s. lewisi* in correlation with this slight peculiarity of dentition. These may have been conspicuous, or they may have been non-existent. The material in our hands permits us merely to examine the skulls, and from them alone, according to my treatment of *Mus sylvaticus*, I can only admit *M. lewisi* to subspecific rank as representing a side development of the *Mus sylvaticus* stock.

MUS ARGENTEUS.

Mus argenteus, C. J. Temminck, Fann. Jap. p. 51, pl. xv. fig. 1 (1845) (on the date of this work see Sherborn & Jentink, P. Z. S. Feb. 19, 1895, p. 149).

Type locality. Japan.

Distinguishing Characteristics. Resembles *Mus sylvaticus* in arrangement of colours, but has the upperside of a peculiar, deeper, more uniform *M. minutus*-like red, of a shade that I have never seen in *M. sylvaticus*. In the specimens at my disposal there is no breast-band and none of the black-tipped hairs of *M. sylvaticus*. The size is that of *M. musculus*. Temminck states that the general size and the ears of *M. argenteus* are as in *M. musculus*, and the tail is longer than the head and body. Of the colour he writes that "tout le dessus du corps, jusqu'à la

ligne médiane des flancs et des côtés du cou, d'un brun-roussâtre doré; la tête est d'une teinte brune et les longues moustaches sont d'un brun cendré. La couleur blanche de toutes les parties inférieurs s'étend jusqu'à la ligne médiane des flancs et des côtés du cou; les quatre extrémités sont aussi d'un blanc pur."

The *skull* is about equal in size to that of *M. sylvaticus* and with an identical tooth-pattern; the total length of skull of no. 88.9.25.6 (damaged) is slightly over 24 mm.

Distribution. Known only from Japan.

General Remarks. The only specimens of this Mouse at my disposal are nos. 88.9.25.6 and 88.9.25.7, collected by Mr. H. Pryer, and which bear on the labels the simple locality "Japan." The latter is a female with the mammæ arranged as in *M. sylvaticus*, and, since the general pattern of coloration and teeth, and skull, where not damaged, also agree with that species, I can have no hesitation in regarding this Mouse as very closely allied to *M. sylvaticus*. The dimensions of the dried skins, however, seem to show that the animals are considerably smaller than average *M. sylvaticus*.

Although Temminck gives no particulars as to the skull of his *M. argenteus*, and although his figure of that species is a miserable caricature of a dark brown *M. musculus*-like Mouse, with dark feet, long tail, and light underside, his description, which, it will be noted, contradicts his figure in several important respects, fits this Mouse so closely that I feel bound to identify it as *Mus argenteus*.

I can have little doubt that this Mouse is a local development from a *sylvaticus*-like stock, in which the skull has not altered from that of the type, but its peculiar red colour, its size and proportions mark it, as might perhaps have been expected, as the most distinct ally of *Mus sylvaticus* which I have seen.

MUS ORTHODON.

Mus orthodon, R. Hensel, Zeitschr. dents. geol. Gesellsch. 1856, p. 279, pl. xiii. figs. 6-10 (aff. *Muri sylvatico*, fide C. I. Forsyth Major, P.-verb. Soc. Tosc. 1888, p. 129).

Type (skull) from the Ossiferous Breccia of Mt. San Giovanni, Sardinia.

In dealing with *Mus sylvaticus*, I must allude also to *Mus orthodon*, which is believed to be very closely allied to it, and the skulls and teeth of which in the British Museum Collection I have examined. The teeth of this species are far more hypsodont in character, and in immaturity show very deep lateral grooving of the crowns, so that they are also more Vole-like than those of modern *Muridæ*. The first upper molars of the youngest specimen show three internal and three less distinctly marked external convexities. The tubercles have been a good deal worn away, so that their exact disposition can only be guessed; but the teeth certainly give the impression of having had all the nine tubercles of Hensel's diagrams present and regularly arranged when quite

young and unworn. The first upper molar is more hypsodont than either of the next two.

In the next oldest set of teeth the lateral grooving is still evident, but is not nearly so deep as in the youngest; while in quite old and worn teeth the grooves are no longer visible. As they are worn down, the teeth get smaller and at length become separated from each other. The internal convexities of the first molar become less distinct, and the teeth-pattern of the crowns is gradually obliterated. Altogether, the upper teeth remind me very strongly of those of *M. agrarius* Pallas.

The under molars come very close to those of *M. sylvaticus*, but, like the upper, are more hypsodont in character. The tubercles of the first tooth were probably arranged as in *M. sylvaticus*, and the anterior unpaired tubercle is present. There is nothing to call for comment in the last two under molars, the tubercles of which, as in modern species, seem to have been 4 for molar 2, and 3 for molar 3.

The animal was larger than *M. sylvaticus*, and in its dentition shows resemblances both to that species and *M. agrarius*, so that it may, perhaps, have been a direct offshoot from a common stock from which both species have later sprung. In other respects, however, it seems to throw no light on the ancestry of Palearctic *Muridæ*, being even more specialized than the modern species.

TABLE OF DIMENSIONS.

The dimensions of the specimens examined during the preparation of this paper are included in a single table, so as to be more convenient for purposes of comparison. By the careful averaging of a large series of British examples, I have tried to give figures which shall be useful as a standard with which may be compared those of other subspecies. I am conscious that this standard would have been more satisfactory had it been taken from specimens from a single locality, instead of from those procured all over Great Britain. It may, for instance, be some day found that the average dimensions of specimens from North and South Britain are different; but I have had to make the best use of my material, and I think the figures given are a fair average for the ordinary *Mus sylvaticus* of the British Islands generally.

It is not easy to explain the large difference between the minimum and maximum dimensions given in the case of *M. s. intermedius*; but it should be borne in mind that as long as we have to deal with a series of specimens measured by a numerous band of collectors, so long will the individual factor tend to increase the gap between minima and maxima. I venture to think that the number of specimens which have been dealt with is sufficient to make the averages trustworthy and useful for purposes of comparison. It is to them that we must look for an idea as to the true appearance of an ordinary individual of a particular species dealt with, and they are not at all affected by the occasional occurrence of giants or pygmies, the measurements of which counterbalance one another.

Mus sylvaticus intermedius.

GREAT BRITAIN :

	Head and body.	Tail.	Hind foot.	Ear.	Skull, extreme length.
No. of items	62	61	60	26	} 25 to 26 mm.
	mm.	mm.	mm.	mm.	
♂ s. { Maximum	111	103	24.5	17.5	
Mean	92.6	88.2	22.7	15.4	
Minimum	83	67	20	14	
No. of items	31	31	30	12	} 25 to 26 mm.
	mm.	mm.	mm.	mm.	
♀ s. { Maximum	110	98	24	17.5	
Mean	92	84.5	22.5	16	
Minimum	78	70	20	14	
Percentage of specimens in which length of head and body exceeds that of tail				♂ s. 70	♀ s. 74
Percentage of specimens in which length of tail equals or is less than head and body				30	26
Percentage of specimens in which length of head and body exceeds 90 mm.				63	67
Percentage of specimens in which length of head and body exceeds 100 mm.				13	23
Percentage of specimens in which length of feet reaches 24 mm.				7	3
Percentage of specimens in which length of feet does not reach 24 mm.				93	97

** Immature Specimens.*

	Head and body.	Tail.	Hind foot.	Ear.	Skull, extreme length.
	mm.	mm.	mm.	mm.	mm.
♂. Lowestoft, Suffolk, Aug. 25, 1894, Oldfield Thomas.	85	79	23	...	23
♂. Rugby, Warwickshire, Jan. 2, 1894, A. S. Ansten.	78	85	21	...	25
♂. Lyndhurst Road, New Forest, Hants, July 12, 1894, Col. J. W. Yerbury.	81	83	22	...	25
♀. Chiswick, near London, Aug. 31, 1897, Miss D. Sharpe.	83	90	20	17	24
♀ (nursing). Hurlingham, near London, Aug. 31, 1897, R. I. Pocock.	90	71.5	20	...	23
♀. Cheadle, Staffs., Nov. 13, 1897, E. W. H. Blagg.	64	74	20	...	22.3
♀. Dunphail, Elginshire, Scotland, Sept. 19, 1893, W. R. Ogilvie Grant.	57	57	19	...	20

IRELAND :

5 ♂ s, 2 ♀ s. Ballaghmoon, Carlow, Jan. 20 to Mar. 6, 1896, J. G. Symes (e coll. Barrett-Hamilton). Measured by F. Metcalfe.	Max.	103	105	24
	Mean	93	85	22.6
	Min.	85	62	20

* The length of foot, apart from the coloration, distinguishes these from *Mus musculus*, of which I take at random the following dimensions for comparison, viz. :—

	Head and body.	Tail.	Hind foot.
♂	83	78	17
♀	79	72	16

		Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.	Skull, extreme length. mm.
IRELAND:						
4 ♂s, 1 ♀. Co. Wexford, Ire- land, Jan., Mar., & Apr. (<i>e</i> coll. Barrett-Hamilton). Measured by F. Metcalfe.	Max.	95	97	22	16	} 25
	Mean	91	86.2	20.2		
	Min.	84	75	18	15	
2 ♂s and one unsexed. Ca- shel, Tipperary, Ireland, Jan. 1895.	Max.	103	70	22.5	16	
	Mean	92	74	22	15.5	
	Min.	87	87	23.5	15	
SHETLAND:						
Adult nursing ♀ (<i>e</i> coll. Barrett- Hamilton, no. 538). Recd. from R. Henderson, Oct. 27, 1898		102	100	22	15.5	26
♂. Ditto, ditto		87	87	23	14.5	
♂ (juv.). Ditto, ditto		88	84	22	14	
CHANNEL ISLANDS:						
2 ♂s. Alderney, autumn 1898, W. Eagle Clarke (<i>e</i> coll. Barrett- Hamilton, nos. 543 & 544)		93	95	23	16	
		95	91	23	16	
BELGIUM:						
Liège, altitude 100 metres, Nov. 1894, H. Grönvold; of 10 specimens, all immature, although one was nursing, none exceed 88 mm. for head and body.						
11 ♂s and 6 ♀s. Warene, Oct. 27-28, J. A. Loring, from the collection of the Smithsonian Institution, Washington, D.C., U.S.A. }	Max.	100	100	25	...	} 24 to 25
	Mean	89.5	89.1	22.9	...	
	Min.	75	81	22	...	
HOLLAND:						
Oldest ♂ of 2 ♂s and 2 ♀s, collected by Oldfield Thomas, Aug. & Sept. 1895.		94	83	21.5	16.1	{ 25 (teeth much worn).
SWITZERLAND:						
12 ♂s and 4 ♀s. Meiningen, J. A. Loring, from the col- lection of the Smithsonian Institution.	Max.	107	99	25	...	} 25 to 26
	Mean	93.5	90	23.3	...	
	Min.	78	78	21	...	
BRITTANY:						
6 ♂s. Dinan, Dec. 25-28, 1897, G. E. H. Barrett-Hamilton.	Max.	94	89	24.5		
	Mean	86.5	80.6	22.5		
	Min.	83	75.5	20.5		
3 ♀s. Dec. 21, 1897, ditto ...	Max.	88	83	24		
	Mean	83.41	76.5	23.41		
	Min.	75.35	67.5	22.25		
Combined average, after adding one unsexed specimen.	Max.	94	89	24.5		
	Mean	86.97	79.2	23.13		
	Min.	75.25	67.5	20.5		
FRANCE:						
♂. Cadillac-sur-Gironde, Mr. Young.		100	60	22	12	
♂. Manonville, Nov. 1895, Mons. Lamont	* 122	110	22	14	25	

* Dimensions probably exaggerated.

	Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.	Skull, extreme length. mm.
ITALY:					
2 ♂s, 2 ♀s. Apr. 9 & 10, 1895, A. H. Savage Landor. Apparently young, of which the largest (a ♂) measured	102	84	21	16	

Mus sylvaticus celticus.

2 ♂s, 4 ♀s. Caragh Lake, Kerry, Ireland, Nov. to Dec., Col. J. W. Yerbury.	Max. Mean Min.	90 85.3 80	84 80.8 75	25 22.3 20	15 14.6 14	
♂ & ♀. Femoyle, Castle Gregory, Co. Kerry, Ireland, various dates in winter, G. A. Passingham.	♂. ♀.	87 88	87 84	23.5 21	15 16	25
1 ♂, 3 ♀s. Woodpark, Galway, Ireland, Feb. 13 to Mar. 19, 1896 R. F. Hibbert.	Max. Mean Min.	88 85.8 83	94 85.8 82	23 21.25 20	16 15.5 14	
♀. Skye, N.B., June 24, 1895, J. Steele Elliott.	...	83	84	21	13	

Mus sylvaticus hebridensis.

3 ♂s, 1 ♀. Lewis, Outer Hebrides, W. E. de Winton (from 'Zoologist,' op. cit.).	Max. Mean Min.	112 108 106	100 97.5 95	25 24.25 23.5	16 15.75 15	27
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Mus sylvaticus hirtensis.

St. Kilda:						
1 ♂. H. Evans, 1898 (e coll. Barrett- Hamilton, no. 556).		107	91	24.5	17	29
♀, in alcohol. Ditto		110	94	24	15	

Mus sylvaticus typicus.

Upsala, Sweden (e coll. Smith- sonian Institution, Washington, D.C., U.S.A.).	♂. ♀.	95 93	89 66	21 20		
Hilleröd, Zealand, Denmark, alti- tude 10 m., May-June 1898, Oldfield Thomas. Almost topo- typical of <i>M. flavicollis</i> Melchior.	(nursing). ♂. ♀.	104 103	111 114	25 24	17 17.5	26
					[One skull from this locality reached 27.]	

Mus sylvaticus, subsp. incert.

Bergen, Norway:						
4 ♂s. (E Coll. Smithsonian Institu- tion, Washington, D.C., U.S.A.)	{	88 93 89.5 95	125 110 62.5 99	*26 *26 *24.5 *23	...	†27
3 ♀s. (Ditto.)	{	93 83 92	89 98 103	*22.5 *24 *24.5	...	†25 (nursing)

* These measurements include the claws.

† Teeth partly worn.

‡ Teeth much worn.

Mus sylvaticus wintoni.

3 ♂s, 1 ♀. Graftonbury, Hereford- shire, England. (E Coll. W. E. de Winton.)	Max. Mean Min.	108 110.75 115	108 111.75 112	23 23.75 24	18 18 18	29 28 27
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		Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.	Skull, extreme length. mm.
3 ♂s. Haute-Savoie, France, Dec. 1899, A. Robert. (An intermediate form.)	{ ♂. 95 ♂. 95 ♂. 98 ♂. 110	108 96 99 80	25 25 26 22	17 17 20 22	27 27 28 28	
4 ♂s. Strass b. Burgheim, Bavaria, March 1895, Lord Lilford.	{ ♂. 110 ♂. 100 ♂. 105 ♂. 93	108 96 110 105	25 22 23 27	...	28 28 28 28	
♂ & ♀. Haida, Bohemia	{ ♂. 110 ♀. 97	95 99	25 24	16 ...	28 27	
Brunswick, Germany :	{ ♂. 96 ♂. 94 ♂. 112 ♂. 110	95 91 110 94	25 20 23 25	...	27 26 27	
5 ♂s. August. (More or less intermediate.)						
13 ♂s. Aug. & Sept., J. A. Loring, from the collection of the Smithsonian Institution, Washington, D.C., U.S.A.	{ Max. 94 Mean 84·8 Min. 73	102 90·7 79	24 22·5 21	...	24 to 25	
Niesky, Silesia :	{ ♂. 97 ♂. 115 ♀ (juv.). 93	83 120 101·5	22·5 24 22·5	19 17·5 17·5	24	
2 ♂s, 1 ♀. Feb. & Nov. 1898, W. Baer.						
<i>Mus sylvaticus princeps.</i>						
9 ♂s. Bustenari, Roumania, W. Dodson.	{ Max. 119 Mean 110 Min. 102	111 110·7 97	25·5 24·5 24	19·5 17·94 15	27·5 to 30 (nearly).	
7 ♀s. Bustenari, Roumania, W. Dodson.	{ Max. 110 Mean 105·28 Min. 101	115 105·85 98	25 23·21 22	19 17·85 16·5	27 to 28	
An obviously young specimen in slaty coat, from Roumania, taken April 15, 1899, measures as much as	{ 87	81	22·5	14·5		
<i>Mus sylvaticus islandicus.</i>						
4 specimens in Copenhagen Museum, fide Herr H. Winge (2 in alcohol).	{		23·5 21 (juv.) 22	17 13·5 14		
2 skins, ditto. (Ear measured from lower border of ear opening.)	{		23·5 15			
<i>Mus sylvaticus hayi.</i>						
Portugal :						
Cintra (altitude 230-330 m.), Jan., Feb., Mar. 1896, Oldfield Thomas.	{ Largest ♂. 100 Largest ♀. 100	107 100	24·8 24	17 17	27	
Estoril, ditto, ditto	 ♂. 101	103	23·3	16·2	26	
(Five others are large, but immature.)						
Morocco :						
8 ♂s. Tangier, Mar. & Apr. (partim coll. Barrett-Hamilton, partim coll. by W. Dodson for J. I. S. Whitaker).	{ Max. 110 Mean 95·62 Min. 85	114 98·25 78	23 22·12 20	...	26	
1 ♀. April 1, 1895 (G. B.-H.).	100	90	22			

		Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.	Skull, extreme length. mm.	
<i>Mus sylvaticus</i> , subsp. incert.							
Spain :							
2 ♂s, 1 ♀, in alcohol. Nos. 194.1.1.10 to 13, Villabra, Galicia, Prof. V. L. Seoane...	} Max. Mean Min.	91	97	23	15		
		82.6	88.3	22.23	14.25		
		77	82	22	13		
♂. Farrerdel Allo, near Coruna, Prof. V. L. Seoane.		80	91	23	14		
♂. Ditto.	(Juv. ?)	81	72	20	11		
♂. Ciudad Real, Spain, F. Lataste, 1883 (alcohol).		75	80	23	14.5		
♀. Ditto (skin).....		84	81	22	11.5		
Corsica :							
2 ♂s. Nos. 93.9.15.6 to 8, La Fue di Villarora (Beech Forest), altitude 3000 ft., Col. J. W. Yerbury.....	} ♂. ♂.	88 78	92 71	23 24	15 16	} 26	
[<i>Mus sylvaticus dichrurus</i> .							
Palermo, Sicily, e coll. J. I. S. Whitaker, Aug. 6, 1898, & Nov. 13, 1898.	} ? sex (stuffed). ♀ (nursing). ♂ (juv.). ♀ (juv.).	95	78	21	15		
Ditto, Nov. 10, 1898		100	102	22			
Ditto, Nov. 18, 1898		74 71	66 69	20 22	15 15]		
<i>Mus sylvaticus algerus</i> .							
Three specimens in alcohol (<i>vide</i> Mons. F. Lataste, <i>op. cit.</i> 1883, p. 12).	} ♂. ♀. ♀.	... 72 ...	69 64 84	18.5 19 23			
<i>Mus sylvaticus tauricus</i> .							
Type specimen	...	...	...	...	...	{ Skull. 23×12	
<i>Mus sylvaticus major</i> .							
Herr Radde's* specimen from the Bureja Mountains (? Trans-Baikalia).		118	97	24	13.5		
* Radde gives total length, including tail, as 215 mm., and head and body as 118 mm. whence by subtraction I get tail 97 mm.							
<i>Mus sylvaticus arianus</i> .							
Type series (inches roughly reduced to mm.), <i>vide</i> Blanford, East. Persia, p. 55. (Height of ear measured from orifice to tip.)	} ♂. ♀. ♂. ♀.	102 96 97 104	107 96 77 97	23 20.25 19 19	18 12.8	(Gulmerg, Persia, no. 96.11.2.1.) 28×14	
<i>Mus sylvaticus chevrieri</i> .							
Type specimen (a quite adult ♀, <i>vide</i> Milne-Edwards).		120	90				
One of Milne-Edwards's typical series as measured by Mr. Oldfield Thomas.		100	90	21.5			

		Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.	Skull, extreme length. mm.
Three of typical series as measured by Herr E. Büchner.	$\left\{ \begin{array}{l} \text{♂.} \\ \text{♂.} \\ \text{sex (?) } \end{array} \right.$	$\left\{ \begin{array}{l} 113 \\ 121 \\ 100 \end{array} \right.$	$\left\{ \begin{array}{l} 79 \\ 79 \\ *65.5 \end{array} \right.$	$\left\{ \begin{array}{l} 22 \\ 21 \\ 22.5 \end{array} \right.$		
No. 82.6.16.7 of British Mus. coll., South Shensi, China, Père David. (Dimensions taken from dried skin.)	$\left\{ \right.$	$\left\{ \begin{array}{l} 90 \end{array} \right.$	$\left\{ \begin{array}{l} 75 \end{array} \right.$	$\left\{ \begin{array}{l} 20.5 \end{array} \right.$	$\left\{ \begin{array}{l} 15 \end{array} \right.$	$\left\{ \begin{array}{l} 25 \end{array} \right.$

* Tail perhaps damaged.

Mus sylvaticus draco.

♂. No. 98.11.1.20, Kuatun, Bohea Mts., N.W. Fokien, S.E. China, April 18, 1898, J. D. La Touche.	$\left\{ \right.$	$\left\{ \begin{array}{l} 91 \end{array} \right.$	$\left\{ \begin{array}{l} 95 \end{array} \right.$	$\left\{ \begin{array}{l} *20 \end{array} \right.$	$\left\{ \begin{array}{l} \dots \end{array} \right.$	$\left\{ \begin{array}{l} 25 \end{array} \right.$
♀. No. 98.11.1.21, ditto, ditto, April 27, 1898.		$\left\{ \begin{array}{l} 83 \end{array} \right.$	$\left\{ \begin{array}{l} 91 \end{array} \right.$	$\left\{ \begin{array}{l} \dots \end{array} \right.$	$\left\{ \begin{array}{l} \dots \end{array} \right.$	$\left\{ \begin{array}{l} 25 \end{array} \right.$

* This item from dried skin only; those of head and body and tail are collector's measurements converted from inches.

Mus argenteus.

No. 88.9.25.6. Japan (H. Pryer).	88	70	*17.5	*10	24
No. 88.9.25.7, ♀. Ditto.	78	65	†17.5	†10	24

* Dimensions from the dried skin; these increase to 19.5 and 13 when the skin is wet.

† Collector's dimensions reduced from inches.

EXPLANATION OF PLATE XXV.

Geographical variation in *Mus sylvaticus*, as illustrated by (fig. 1) *M. s. princeps* (p. 408), the large light form of Roumania; (fig. 2) *M. s. celticus* (p. 401), the small dark form of Co. Kerry, Ireland.

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